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*Prepared for*

State of Washington  
Legislative Transportation Committee

*January 1992*

*Final Report*

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# **Volume II: Evaluation of the State's Programming Process**

*Programming and Prioritization Study*

*Prepared by*

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Cambridge Systematics, Inc.

*with*

Wilbur Smith Associates

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# Executive Summary

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# Executive Summary

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## ■ Introduction

This report evaluates Washington's state highway programming and prioritization process. The objectives of the evaluation are to review critically the different methods used for project or needs identification, evaluation, prioritization, and selection, and to assess the extent to which the state's policies and objectives are being addressed by its programming and prioritization procedures. The findings of this evaluation will contribute to the recommended changes to the state's programming process.

This evaluation takes place in the midst of significant shifts in Washington's policy objectives affecting transportation. The most recent transportation policy plan defines six major policy areas:

- Protection of transportation system investments;
- Transportation support for economic opportunity;
- Personal mobility;
- Environmental protection and energy conservation;

- Transportation finance; and
- Working together (recommendations for the planning and programming process itself).

Washington has a considerable body of legislation that articulates goals and objectives for transportation system development, and establishes the process by which fund allocation and programming decisions are made. The Washington Administrative Code also sets forth a number of specific policies for individual funding programs. Existing legislation therefore defines requirements for the state highway programming process in both a policy and a procedural sense, governing project development and selection by the Department of Transportation (WSDOT), the County Road Administration Board (CRAB), and the Transportation Improvement Board (TIB). Furthermore, state legislation has recently addressed several policy initiatives that have very significant implications for transportation: e.g., growth management, transportation demand management, highway access management, clean air requirements, high occupancy vehicle systems, and high capacity transportation, among others.

According to existing legislation, WSDOT's highway construction program comprises four major categories:

- **Category A:** system preservation and safety;
- **Category B:** Interstate completion and 4R (resurfacing, restoration, rehabilitation, and reconstruction);
- **Category C:** Non-Interstate capacity improvements (both new capacity and expansion of existing capacity); and
- **Category H:** Bridge replacement and rehabilitation.

Legislation also mandates the order in which these categories are funded, and the criteria to be used to set priorities of needs or projects. The analysis of priorities is based upon a technical ranking for preservation and bridge programs, and a cost-effectiveness computation for non-Interstate new construction. Overall, the approach is quite detailed, structured, and analytic. Other relevant programs include Category M (routine maintenance) and Category Z (pass-through of Federal-Aid to local jurisdictions).

CRAB administers two programs: the County Arterial Preservation Program (CAPP) and the Rural Arterial Program (RAP). Funds available for these programs are established by the statutory distributions of revenues from motor vehicle fuel taxes. CAPP funds are distributed to individual counties based upon their respective shares of paved arterial lane miles, subject to their development of six-year plans for rural arterial projects and their use of pavement management systems. RAP funds are allocated to



five different regions of the state through a formula based upon rural land area and miles of rural collectors. Separate priority ranking schemes are used in each region, based generally on traffic volumes, accidents, structural condition, geometrics, or other factors.

TIB also administers two programs: the Urban Arterial Trust Account (UATA) and the Transportation Improvement Account (TIA). Both of these accounts are funded by an apportionment from the state fuel tax. The UATA program is divided into urban and rural components. For the urban program, funds are apportioned to five regions based upon respective shares of total urban area population, non-Interstate vehicle miles, and urban arterial preservation needs. For the rural program, funds are divided based upon relative population percentages within each region. The TIA comprises an urban program (receiving 87 percent of the funds) and a small cities program (receiving the remaining 13 percent). Local jurisdictions identify projects which meet UATA or TIA program criteria as part of their six-year program development process. UATA program evaluation criteria are the same as those established for WSDOT Categories A and H. TIA projects are scored and ranked by a totally different approach, considering factors such as multi-agency participation, use of multimodal solutions, degree of congestion and safety improvements, economic development, and magnitude of local match.

The procedures in each of these programs are explained in some detail, and then evaluated according to several measures:

- Consistency with, and responsiveness to, various policy objectives;
- Adequacy of program structure to set priorities, measure accomplishments, adapt to changes, and avoid undesirable biases;
- Basis of fund allocation among program categories, and the influence of federal and state matching requirements; and
- The scope and operation of the project identification and prioritization process (e.g., ability to consider wide range of options; effect of service and design standards; provision for state-local coordination).

The results of this evaluation may be summarized as follows (pertaining to the WSDOT process except where noted):

- The current process responds well to existing statutory mandates for preservation of the highway investment, safety, and mobility, but less so for emerging policies: e.g., encouragement of more efficient transportation modes, support for economic development, growth management, environmental protection and energy conservation, and inter-governmental coordination.

- The current WSDOT program structure does address many of Washington's most pressing needs, and generally supports the objectives of giving priority to highway preservation, making full use of available federal Interstate dollars, and making progress on bridge work. However, there are some aspects of the existing program structure that would benefit from greater clarity, consistency, and ability to measure accomplishments.
- The existing program categories do emphasize preservation over capacity projects, Interstate over non-Interstate capacity, and bridge projects over (non-Interstate) highway capacity projects. However, projects aimed at objectives such as economic development, transportation demand management, or use of high-occupancy vehicles are not explicitly supported by the category structure.
- Fund allocation among the different categories is rooted in programming legislation, ensuring that certain objectives are addressed. However, this allocation procedure does not easily allow or encourage shifts in funding among categories to reflect changing priorities or new objectives.
- The current programming process results in a geographic distribution of revenues that reflects a combination of demographic, system extent, and needs related factors. Federal and state matching policies have a strong influence on expenditure patterns at both state and local levels of government.
- The technical prioritization processes as currently structured do not explicitly address a broad range of alternatives such as low cost projects, demand management strategies, use of public transportation, and intelligent vehicle highway systems. This does not mean that such approaches are not being used, but only that the programming process does not include explicit consideration of these measures.
- The use of service standards in the programming process appears to be reasonable and not inconsistent with the objectives of the respective program categories (i.e., the need to deal with roads of different functional classes or in different geographic regions). However, it is important to recognize that service standards reflect important policy choices.
- While no formal interjurisdictional review is required for the state's six-year program, informal coordination occurs between district and local staffs. However, differences in the length and timing of programming cycles between the state and local jurisdictions sometimes present a problem for coordination of projects.

Interviews were held with staffs in five other states to obtain information on their programming processes, and to be able to compare these processes with Washington's. This comparison of essential features indicates both considerable similarities (e.g., in the estimates of needs based upon deficiencies) and differences (e.g., in the various ranking procedures used). Certain analytic features used by other states illustrate how different types of considerations may be included in a programming process (e.g., the evaluation of the degree to which candidate projects satisfy clean air requirements in California).

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# 1.0 Introduction

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# 1.0 Introduction

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## ■ 1.1 Scope

This report presents an evaluation of Washington's state highway programming and prioritization process. The objectives of the evaluation were to critically review the different methods in use for project identification, evaluation, prioritization and selection, and assess the extent to which the state's policy objectives are being addressed by the process. The findings of this evaluation provide the basis for recommending changes to the state process.

The scope of this evaluation included fifteen different tasks, which are listed in Table 1.1. Key work elements were as follows:

- Summarize current state highway policy objectives;
- Document the legislative basis for highway programming;
- Describe the state's current highway programming structure, process, and methods;
- Evaluate the process from both technical and policy perspectives; and
- Document the programming processes used in other states to provide a basis for comparison.

**Table 1.1 State Highway Programming Process Evaluation Tasks**

- 
- B.1 Analyze State Transportation Objectives and Policy Directives
  - B.2 Review State Programming and Prioritization Process
  - B.3 Assess Consistency and Bias
  - B.4 Analyze State Highway Program Categories
  - B.5 Evaluate State Maintenance, Preservation, Capacity Improvements and Program Administration
  - B.6 Evaluate State Process
  - B.7 Develop Fiscal History
  - B.8 Conduct Survey of Other States
  - B.9 Review Federal and State Revenue Matching Policies
  - B.10 Evaluate State and Local Project Coordination
  - B.11 Analyze State Service and Design Standards
  - B.12 Review Evaluation Methods for Low Cost Capital Projects
  - B.13 Evaluate Revenue Distribution Impacts
  - B.14 Analyze Sample Projects
  - B.15 Assess Transportation Policy Impacts
-

A number of specific programming impacts and issues were defined to focus the evaluation. These issues are captured in the following questions:

- Does the programming process have the flexibility to allow for shifts in policy at both Federal and state levels?
- Does the program structure or methods result in undesirable biases towards (or against) particular types of projects?
- Does the process result in inconsistent or conflicting strategies?
- What is the influence of Federal and state revenue matching policies on the types of projects which are emphasized in state and local programs?
- How do geographic distribution considerations enter into the programming process, and how do they affect project selection and resource allocation?
- Are consistent prioritization approaches used in the different program categories?
- Is the basis for fund allocation among the different categories appropriate?
- What logistical difficulties exist for state and local project coordination?
- How do service and design standards affect the outcome of the programming process?
- To what extent are low cost or operational strategies considered as alternatives to higher cost strategies?

## ■ 1.2 Overview of Report

The remaining four chapters of this report synthesize the findings of the 15 subtasks. Chapter 2.0 summarizes the state's highway policy objectives which have been formally adopted in policy plans, legislation, directives and official reports. This chapter covers Subtask B.1. Chapter 3.0 provides background on state highway expenditure trends, state legislation, and funding programs, and describes the programming and prioritization methods in use for each of the state's program categories. Subtasks B.2 and B.7 are covered here. Chapter 4.0 evaluates the programming process, addressing the specific issues listed above. All remaining subtasks are

summarized in this chapter, with the exception of B.8. Chapter 5.0 summarizes the review of programming practices in other states as required in Subtask B.8. Subtask B.15 – the assessment of transportation policy impacts – is addressed in Chapters 2.0, 3.0 and 4.0.

A list of acronyms and their explanations is given at the end of Volume I of this series of reports.



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## **2.0 Policy Objectives for Highway Programming**

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## 2.0 Policy Objectives for Highway Programming

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### ■ 2.1 Overview of Policy Objectives

The first step in evaluating Washington's highway programming process was to summarize the state's policy objectives related to planning, maintenance and development of the highway transportation system. Highway policy objectives are defined in the State Transportation Policy Plan, the body of state legislation which addresses transportation and related issues, and plans and programming documents developed by WSDOT.

The **State Transportation Policy Plan** presents a broad set of objectives to be addressed, including protection of transportation system investments, support for economic development, enhancing urban and rural mobility, environmental protection, and growth management.

**Legislation** that addresses prioritization of state highway projects emphasizes preservation of the structural, safety, and operational integrity of the existing system. Legislation establishing funding programs for urban and rural arterials also supports preservation, safety, and mobility objectives. Broader objectives related to urban area transportation development and the environment are reflected in a number of different pieces of legislation covering growth management, high occupancy vehicles, high capacity transportation, clean air, highway access management, and transportation demand management, among other topics.

WSDOT has established a general statement of strategic objectives, which are consistent with the State Transportation Policy Plan. The department's highway planning documents focus on the establishment of improvement guidelines for specific highway segments which account for the relative importance of each segment to the statewide transportation network. Relative importance is determined by factors such as traffic volumes, functional classification, and route continuity and redundancy considerations. The policy objectives implicit in these plans are to focus resources on highway segments that are most essential, and to emphasize lower cost maintenance activities on those highways serving less critical needs.

The specific contents of the Policy Plan, relevant legislation, and WSDOT planning documents are summarized in the remainder of this chapter.

## ■ 2.2 State Transportation Policy Plan

The State Transportation Policy Plan defines six policy areas:

- Protection of transportation system investments
- Transportation support for economic opportunity
- Personal mobility
- Environmental protection and energy conservation
- Transportation finance
- Working together (planning and programming process recommendations)

### **Protection of Transportation System Investments**

Recognizing that projected revenues are expected to fall far short of highway needs through the year 2000, the policy plan recommends that road, street, and highway preservation be emphasized as the priority for transportation funding, and that sufficient funds be provided to ensure the preservation and safe operation of roads and bridges.

## **Personal Mobility**

Urban mobility policies call for use of demand management strategies, capacity improvements which emphasize movement of people and goods as opposed to vehicles, regional coordination, transportation and land use coordination and concurrency, and the flexibility to tailor transportation solutions to the unique needs of each urban area.

Proposed rural mobility policies emphasize coordination of Federal, state and local transportation programs integrating social service, health care and transportation objectives, and establishment of intermodal connections.

## **Support for Economic Opportunity**

Three areas are emphasized: freight and goods mobility, economically distressed areas, and tourism. Goods mobility policies address the need to expand service to ports and airports and maintain internal movement of freight while taking into account changes in trucking technology and economics, abandonment of rural rail service, seasonal load restrictions which affect agricultural shipments in eastern Washington, and other factors. To support economically distressed areas, the recommended policy is to provide infrastructure improvement projects which enhance goods delivery and attract business, but only where substantial financial commitments have been made by business. Regarding tourism (which is the fourth largest industry in Washington), the policy plan states that limited funds do not permit major transportation expenditures in direct support of tourism. However, it does recommend a determination of transportation projects which may be needed to better serve tourism.

## **Environmental Preservation and Energy Conservation**

A number of stated transportation policies promote air quality, water quality, protection of natural resources, energy conservation, visual quality, and noise abatement. High capacity transportation, transportation system efficiency strategies (such as signal coordination), transportation demand management policies, and high-occupancy vehicle lanes are explicitly supported. The Growth Management Act is cited as a mechanism for ensuring protection of wetlands and incorporation of energy efficiency principles into land use and transportation planning and development. One of the recommended actions is to require that transportation plans, programs and projects conform to policies to eliminate violations of Federal air quality standards.

## **Transportation Finance**

Policies in this category emphasize the identification and justification of needs in advance of transportation revenue increases, promotion of flexible local finance options, the development of new revenue sources dedicated to transportation, the use of pricing to promote efficient system usage and interjurisdictional and intermodal cooperation in the distribution and expenditure of transportation revenues.

## **Working Together**

This portion of the policy plan addresses needs for multi-jurisdictional coordination in planning and programming of transportation projects, establishment of a regional transportation planning process consistent with the Growth Management Act, coordination of transportation and land use planning, and increased consistency in the format of six-year transportation improvement programs across governmental levels.

## **■ 2.3 Legislation**

Washington has a considerable body of legislation which articulates goals and objectives for transportation system development and establishes the process by which fund allocation and programming decisions are made. The Washington Administrative Code also sets forth a number of specific policies for individual funding programs. This section focuses on the policy intent of the legislation as opposed to the procedural content, which will be discussed in Chapter 3.0. The following sections present a partial listing of the legislation affecting transportation programming.

### **Priority Programming and Six-Year Planning Requirements**

Statewide priority programming legislation (RCW 47.05) defines requirements for the state highway programming process. The policy objectives of this legislation are as follows:

- Give first priority to preserving the existing investment in highways, and pursue new non-Interstate highway projects only after all preservation, Interstate completion, and bridge needs are met.

- Make full use of available Federal funds for Interstate and other categories, as long as adequate state monies can first be allocated to address preservation needs before providing the required Federal match.
- Consider structural integrity, service and safety in the selection of highway preservation projects.
- Consider the need for route continuity in all facets of the programming process, including functional classification of roads, and selection of improvement projects.
- In development of new highway projects, support a coordinated multimodal transportation strategy, ensure consistency with local plans and objectives, and consider the full range of social, economic, and environmental impacts.
- Establish a rational and well-documented process for programming of state highway funds which allows for priorities to be explicitly set according to functional class of road and nature of road improvement based on standardized criteria.
- Provide for ongoing revision of plans to allow changing needs, objectives and resource availability to be reflected.
- Build sufficient flexibility into the process to address unforeseen conditions and needs and to make full use of available local and Federal funding sources.

## **Arterial Funding Programs**

The Urban Arterial Trust Account was established with the policy objective of alleviating and preventing intolerable traffic congestion in urban areas. The legislation establishing the program earmarks a source of funds for urban arterial construction and improvement projects, and supports a number of policy objectives:

- Preservation of investment in infrastructure, improvement of service to road users (congestion relief), and safety.
- Consistency of arterial improvements with local land use plans.
- Encouragement of bicycle routes.
- Encouragement (through the Transportation Improvement Account) of multimodal projects, those supporting economic development, and those which creatively tap local funding sources.

- Equitable geographic distribution of funds based on population, road usage and unmet needs.

The Rural Arterial Trust Account was established to support construction and improvement of major and minor collectors in rural areas. The legislation establishing this account provides for geographic distribution of funds and emphasizes maintenance of structural integrity, traffic flow, and safety. The administrative code implementing priority programming for the Rural Arterial Program acknowledges differences from region to region in priorities to be addressed.

The County Arterial Preservation Program was established to support preservation of paved arterials in unincorporated areas. Geographic equity and the use of pavement management methods to maximize the benefits of investment are emphasized in legislation and administrative code for this program.

## **Growth Management**

The Growth Management Act requires a strong regional transportation planning process, coordinated interjurisdictional planning and the concurrency of transportation and land use development projects. The provisions of the Growth Management Act and amendments address several policy issues raised in the Transportation Policy Plan, and have significant implications for programming and prioritization. Key policy objectives of the act are as follows:

- Strengthen a regional planning approach in growing portions of the state, ensuring that plans of local governments are coordinated and consistent with established regional plans.
- Foster interjurisdictional coordination on transportation programming in order to efficiently improve the regional transportation system.
- Strengthen links between transportation investment decisions and broader regional development objectives.
- Encourage efficient, multimodal transportation systems.

## **Federal and State Clean Air Acts**

Amendments to the Federal Clean Air Act passed in 1990 are expected to have major impacts on transportation planning, programming, and project development in non-attainment areas. Metropolitan areas that are in

serious violation of air quality standards are required to implement transportation control measures to reduce vehicle miles of travel and congestion. Areas in Washington that may be affected by these new regulations are Seattle-Tacoma, Portland-Vancouver, Spokane, and Yakima.

The new state Clean Air Act requires conformity between the state implementation plan for air quality, and the approval or funding of transportation plans, programs, and projects. This conformity requirement extends to state agencies, local governments, and metropolitan planning organizations. However, maintenance and preservation projects are exempted from this conformity requirement. A deadline of December 31, 1995 has been set to return areas with poor air quality to levels adequate to protect health and the environment.

## **Transportation Demand Management**

Transportation demand management legislation addresses congestion, air pollution, mobility, and energy conservation objectives by requiring actions which will reduce the number of employee commute trips in single-occupant vehicles. Plans for such trip reductions are to be prepared by local governments. In metropolitan areas designated as non-attainment for carbon monoxide and ozone, employers with over 10 employees may be required to implement trip reduction programs.

## **High Occupancy Vehicle Systems**

High-occupancy vehicle legislation states that "the need for mobility, growing travel demand, and increasing traffic congestion in urban areas necessitate accelerated development and increased utilization of the high occupancy vehicle system". The legislation establishes a taxing authority for counties to support HOV development and use.

## **High Capacity Transportation**

High capacity transportation legislation establishes a state high capacity transportation account and calls for the state to implement a program for high capacity transportation coordination, planning and technical studies. High capacity transportation is defined as a service operating on an exclusive right-of-way which provides a substantially higher level of passenger capacity, speed and service frequency than traditional public transportation systems operating principally on general purpose roadway rights-of-way. The legislation also states that the DOT shall provide



assistance to local jurisdictions and metropolitan planning organizations with high capacity transportation planning efforts.

## ■ 2.4 WSDOT Planning Documents

### **WSDOT Strategic Management Objectives**

The stated mission of the department is to ensure a multimodal transportation system which meets the social, economic and environmental needs of the state. The specific objectives and strategies of the department have evolved to place a stronger emphasis on preservation of the existing transportation system, integration of environmental considerations, and use of multimodal and operational approaches. A host of new considerations have also been included, such as safety, special needs transportation issues, airport access and capacity, and economic development.

### **Level of Development Plan**

The Level of Development Plan identifies the relative importance of each highway segment to the state as a whole as the basis for determining the types of improvements which should be performed. The primary criteria used to establish the relative importance of different segments include functional classification, area type (rural, urban, Puget Sound), transportation corridors and traffic volumes. Secondary criteria include system and route continuity considerations, the practical extent of improvement possible, the utilization of urban streets, and highway system redundancy vs. local service.

Three levels of development are established for state highway segments. The most important segments are designated for improvement (or design) to design standards which provide for a satisfactory level of traffic service, operational efficiency and safety. Higher functional classification highways which serve primarily local or community travel and experience only moderate traffic volumes are designated for 3R (resurfacing, restoration and rehabilitation) improvements. Highways serving less critical needs are designated to receive the minimum improvement necessary to maintain structural integrity and operational safety.

## **Highway System Plan**

The Highway System Plan designates principal highways as freeway (full access control), expressway (partial access control), and other (partial, modified, or no access control), and defines the number of lanes for each route. The plan provides a framework so that decisions about short- to mid-range improvements can be made within the context of the ultimately envisioned design of each facility.

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## **3.0 Background on the Programming Process**

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# 3.0 Background on the Programming Process

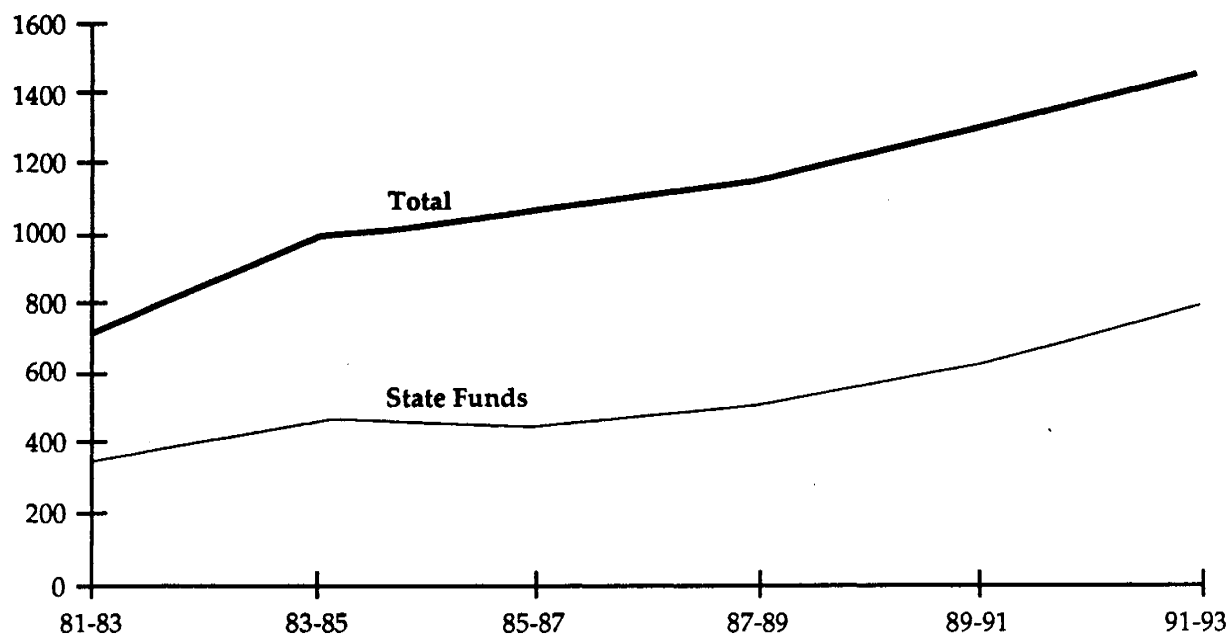
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This chapter provides background information on Washington's highway programming process including:

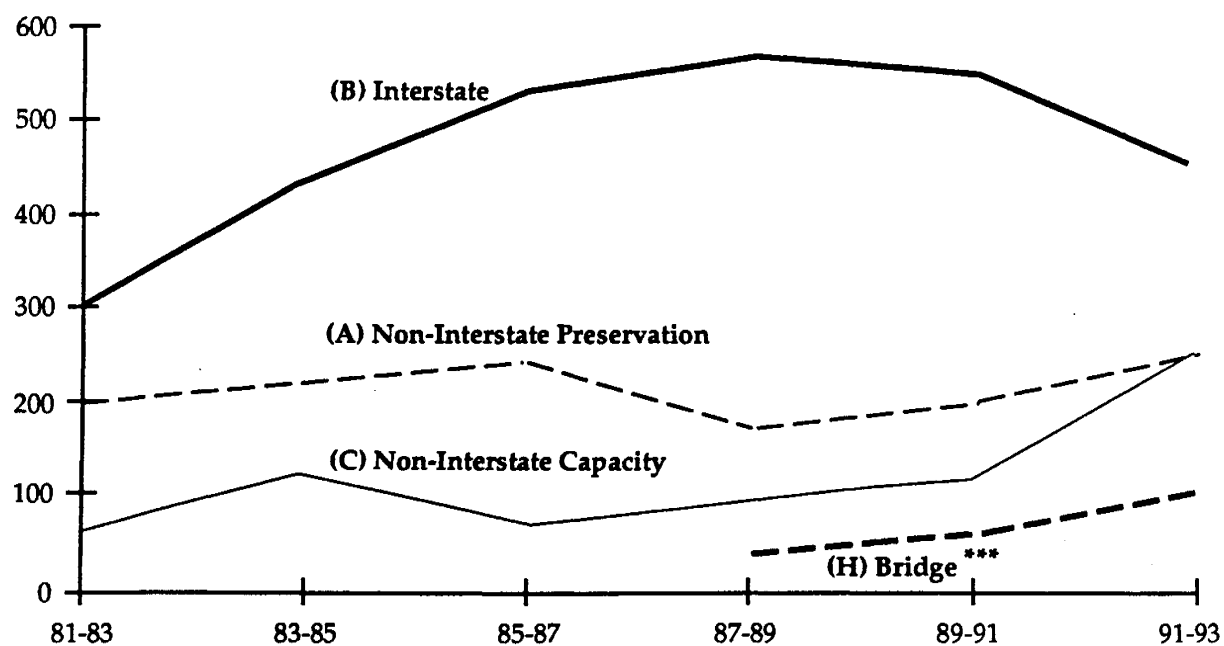
- Highway expenditure trends since 1981;
- The legislative basis for highway programming;
- Program structure and funding allocation methods; and
- Description of current programming and prioritization methods.

## ■ 3.1 Highway Expenditure Trends

For the current (1991-93) biennium, highway expenditures of \$1.4 billion (including state and Federal funds) are estimated. As shown in Figure 3.1, the size of the highway budget has doubled since the 1981-83 biennium. However, the growth in highway spending has not been as rapid as that of general fund expenditures or of Washington's total budget outlays. Highway expenditures have generally increased at the same time as increases in demographic measures such as population, licensed drivers, vehicle miles of travel, and vehicle registrations.

**Figure 3.1 Highway Expenditure Trends (1981-1993)****WSDOT Highway Expenditures\* (\$ millions)**

\* Includes highway construction, maintenance, administration and planning, in current dollars.

**WSDOT Construction Expenditures by Program Category\*\* (\$ millions)**

\*\* Includes state and federal funds, in current dollars.

\*\*\* Bridge programs in Category H were included in Category A prior to the 1987-89 biennium.

Of the total 1991-93 highway funds, 78 percent will be spent on construction, 14 percent on maintenance and eight percent on administration and planning. The relative shares of the budget devoted to construction, maintenance, and administration have remained fairly constant over time.

Federal funds account for about 57 percent of the 1991-93 highway construction budget. This represents a decline in the total Federal share from the high of 72 percent in the 1985-87 biennium. In current dollar terms, Federal funding for highway construction steadily increased from about \$370 million in the 1981-83 biennium to about \$660 million in the 1989-91 biennium. A slight decrease in Federal highway funding is estimated for the 1991-93 biennium, reflecting the completion of major Interstate projects.

Budget estimates for the current (1991-93) biennium indicate significant increases over the past five years (since the 1985-87 biennium) in expenditures for bridge and non-Interstate capacity projects (150 percent), a moderate increase in expenditures for preservation projects (43 percent), and a decrease in Interstate project expenditures (-21 percent).

## ■ 3.2 Legislative Basis for Highway Programming

### WSDOT

The current WSDOT highway programming process is based on Chapter 47.05 RCW, Priority Programming for Highway Development. Key provisions of this legislation are as follows:

- **Six-Year Highway Program:** The Transportation Commission is directed to adopt and biennially revise a six-year improvement program for state highway projects.
- **Program Categories:** Four capital program categories are defined: (A) Improvements necessary to sustain the structural, safety and operational integrity of the existing state highway system; (B) Improvements for continued development of the Interstate system; (C) Development of major transportation improvements including designated but unconstructed highways vital to the statewide transportation network; and (H) Improvements necessary to sustain the structural and operational integrity of existing bridges.
- **Allocation of Funds to Categories:** Factors to be considered in allocating funds to the four program categories include the relative needs in each category, the need to provide adequate funding to protect the state's investment in the existing system, the continuity of highway

development, and the availability of special categories of Federal funds for specific work. The Transportation Commission is directed to establish specific objectives for each program category. Funds are to be first allocated to meet all identified needs in Category A (preservation), then to meet Category B (Interstate) objectives, then H (bridges), and finally to Category C (non-Interstate capacity).

- **Project Prioritization Within Categories:** For preservation Categories A and H, prioritization is to be based on structural adequacy, traffic carrying capacity, adequacy of alignment and geometry, accidents and fatalities. For new capacity Category C, prioritization is to be based on continuity of development of the highway network, coordination with the development of other transportation modes, support for stated long-range goals of the local area to be served, potential social, economic and environmental impacts, and public views concerning the proposed improvements. No specific criteria for selection of Interstate Category B projects are named in the legislation; selection of these projects is to be based on established Transportation Commission priorities for completion and preservation of the Interstate system. No formal process for establishing and revising these priorities is specified in the legislation other than the requirement that the Commission must establish program objectives for each category for each biennial revision of the six-year highway improvement program.

## Programming Requirements for Local Jurisdictions

In 1961, the Washington State Legislature established requirements for counties and cities to prepare and perpetually maintain comprehensive six-year road and street programs. These programs, which are intended to ensure planning and coordination of improvement projects, must be adopted by local legislative bodies and filed with the state.

Since 1961, the legislation has been updated to require designation of rural and urban arterial projects in the six-year program as a condition for state funding from the Rural Arterial Program (RAP) and the Urban Arterial Trust Fund (UATA). General criteria for prioritization of projects for these two funding programs are set forth, and joint planning of multi-jurisdictional projects is required. Requirements have also been added for submission of county programs to the County Road Administration Board (CRAB), and submission of both county and city programs to the Transportation Improvement Board (TIB).

- **Flexibility Provisions:** The Transportation Commission may deviate from established priorities under a variety of circumstances – in order to coordinate with Federal, local, or other state agency projects; to take advantage of some substantial financial benefit which may be available;

to address the need for continuity of route development; to respond to changes in financial or physical conditions of an unforeseen or emergent nature; or to satisfy court judgements, legal agreements or state and Federal regulations. Projects may also be delayed in order to allow counties or service districts to develop local funding to pay for additional highway improvements which may be done at the same time (though at different rates) as those planned by the Department of Transportation.

## Local

Local jurisdictions are required to maintain six-year advance plans of improvement projects (RCW 35.77, RCW 36.81). Key provisions of this legislation are as follows:

- **Separate Arterial Programs:** Programs must include separate sections for arterial street construction to be based on estimates of available local and state revenues. Arterial programs should provide for a more rapid rate of completion of the long-range construction needs of principal arterial streets than for minor and collector streets.
- **Non-Motorized Provisions:** Programs must contain information on how funds will be expended, including funds made available pursuant to Chapter 47.30 for bicycle, pedestrian and equestrian purposes. Programs should include bicycle routes where practicable, except in situations where the cost of providing the route would be excessively disproportionate to the need or probable use.

Legislation establishing the Urban Arterial Trust Account (UATA) and the Transportation Improvement Account (TIA) requires the following programming practices for these funds:

- **Allocation of Funds:** UATA funds are to be allocated to five regions of the state based on each region's share of total urban area population, non-Interstate vehicle miles and urban arterial preservation needs. Eighty-seven percent of TIA funds are to be allocated to cities with populations over 5,000 and to transportation benefit districts. The remaining 13 percent are to be allocated to cities with populations of 5,000 or less.
- **Programming Methods:** Priority programming methods are to be used for budgeting and expenditure of urban arterial funds. Cities and counties must develop six-year arterial construction plans. Rating factors to be used to establish priority rankings of projects included in the plans are structural adequacy, capacity to handle traffic demands, adequacy of alignment and geometry, accidents and fatalities.



- **Planning and Coordination:** Six-year arterial plans must take into account the jurisdiction's comprehensive land use plan. Joint planning is required for urban arterials which span multiple jurisdictions, or connect with (or are substantially affected by) state highway projects.
- **Bicycle Provisions:** A bicycle route system plan must be included in six-year arterial plans. Establishment, improvement and upgrading of bicycle routes are eligible for UATA funds when done in conjunction with an arterial project. Standards for designation of bicycle routes include the extent of existing and potential bicycle traffic, the directness of travel between bicycle traffic generators, and safety.

The Transportation Improvement Board is statutorily designated as the administrator of the Urban Arterial Trust Account and the Transportation Improvement Account programs for local jurisdictions, and is given the responsibility for apportionment of such funds to regions, adoption of "reasonably uniform design standards" for city and county arterials, review and optional revision of six-year programs submitted by cities and counties, and establishment of matching fund requirements for cities and counties receiving funds from the Urban Arterial Trust Account. Specific programming methods for urban arterial funds are set forth in administrative code.

Legislation establishing the Rural Arterial Trust Account (RATA) requires the following:

- **Allocation:** Funds shall be distributed to five regions based on a formula comprising one-third rural land area and two-thirds rural arterial road miles.
- **Programming Methods:** Rural arterial improvement projects are to be selected based on a priority rating of each project which takes into account structural ability to carry loads, capacity to move traffic at reasonable speeds, adequacy of alignment and related geometrics, accidents and fatalities.
- **Coordination:** Joint planning is required for rural arterials that connect with, and will be substantially affected by, a programmed construction project on a state highway.

The County Road Administration Board (CRAB) is designated as the administrator of the Rural Arterial Trust Account and the County Arterial Preservation Account. CRAB has established administrative code which defines programming methods for these two programs.

The Growth Management Act contains a number of provisions which affect programming for local jurisdictions:

- Requires consistency of local road and transit six-year programs with local comprehensive plans, and consistency of local comprehensive plans between adjacent jurisdictions;
- Requires the transportation element of local comprehensive plans to develop level of service standards in a regionally coordinated fashion;
- Authorizes a regional transportation planning program coordinated by Regional Transportation Planning Organizations (RTPOs) which would include local governments in the region, and the participation of the state, ports, transit agencies, and private employers;
- States that all transportation projects within designated regions that are "regionally significant" (i.e., have an impact upon regional facilities or services) must be consistent with the regional transportation plan.

### ■ 3.3 Program Structure and Funding

#### WSDOT Program Categories

According to legislation, WSDOT's highway construction program is structured into four major categories:

- **Category A – System preservation and safety.** Includes pavement resurfacing and structural repair, safety improvements, traffic signal system and intersection improvements, bridge deck preservation, minor roadway widening, and some truck climbing lanes. Improvements are limited, for the most part, to the non-Interstate system, though some minor elements of the Interstate program which are not eligible for Federal-Aid Interstate funds may be included.
- **Category B – Interstate system.** Includes all preservation and completion projects eligible for Federal-Aid Interstate funds. Because of design features, low cost capital projects are not encompassed. Non-traffic functions (such as landscaping) are included.
- **Category C – Non-Interstate capacity improvements.** Includes both new construction and existing facility expansion. This category also includes a "Special Category C" which was established for particular high cost capital projects.
- **Category H – Bridge replacement and rehabilitation.** This category includes safety and structural improvements needed to preserve non-Interstate bridges, and painting of steel bridges on the Interstate system.

Other state highway funding categories include Category M, for maintenance; Category G, for community economic revitalization projects; Category R7, which includes reimbursable projects; and Category Z, for Local Programs, including Federal-Aid funds which are passed through by WSDOT to local jurisdictions.

**Category Z** encompasses WSDOT programs of financial and technical assistance to local jurisdictions in support of a strong state-local partnership in delivery of transportation services. Three subcategories within Category Z have been defined:

- **Management and Support**, including the administration of Federal-Aid funds for local agencies, optimization of Federal and state funds available to local agencies, provision of assistance to local agencies in obtaining and utilizing available funds, and provision of technical and engineering services and training. Special statewide studies are also funded through this subcategory.
- **Construction of System**, which includes funding of road and street improvements off of the state highway system, primarily through Federal-Aid funds distributed to local jurisdictions, and associated local matching funds. This subcategory accounts for the lion's share of Category Z expenditures.
- **Everett Homeport**, which is for state and federally funded access roads in support of the U.S. Navy's proposal to establish a homeport in Everett.

Figure 3.2 summarizes characteristics of each program category.

## WSDOT Program Funding Sources and Allocation

Funds made available to the Department of Transportation primarily derive from a portion of the state collected fuel taxes and motor vehicle fees dedicated to road purposes and from a portion of the Federal-Aid funds made available to the state. These two sources constitute the bulk of revenues which the department has available to allocate to the different program categories.

Both Federal and state funds are used for each of the four construction program categories. In the 1991-93 biennium, an estimated 40 percent of Category A funding will be Federal (Federal-Aid Primary, Secondary, Hazard Elimination, and Rail-Highway Crossings). For Category B, Federal Interstate funds account for nominally 90 percent of the costs, with the state contributing the required 10 percent match. A relatively small

Figure 3.2 Characteristics of the WSDOT Program Structure

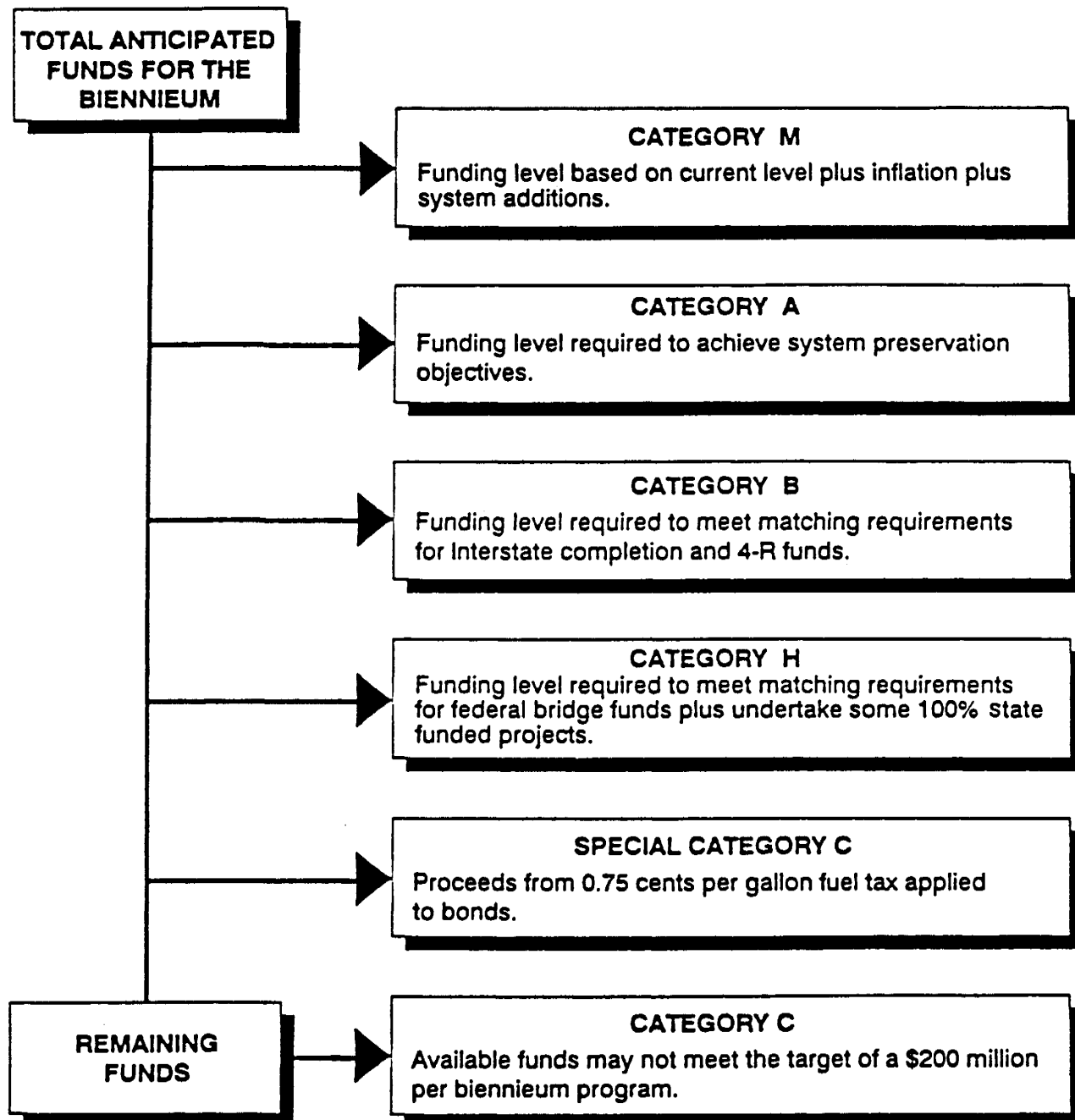
Characteristic	Program Category						
	A	B	C	Special C	H	M	Z
<b>Type of Project</b>							
Safety	●	●			●	○	●
Structural Preservation	●	●			●	●	●
Low Cost (TSM)	●						●
Capacity	○	●	●	●			●
Multimodal		●	●	●			○
Operational	●					●	●
Non-Traffic Functions		○	○	○		●	○
<b>Systems</b>							
Interstate	○	●			○	●	
Non-Interstate	●		●	●	●	●	●
<b>Type Facility</b>							
Roadways	●	●	●	●		●	●
Bridges	○	●	●	●	●	○	●
Multimodal		●	●	●		○	○
Ancillary		○	○	○		●	○
● Significant Element ○ Minor Element							

portion of Category C funds (seven percent) will come from Federal sources in the current (1991-93) biennium. In previous biennia, Category C was 100 percent state funded. An estimated 50 percent Category H expenditures will be funded with Federal bridge funds, which have a 20 percent match requirement. Thus, preservation, Interstate and bridge categories have significant Federal funding shares. For preservation and bridge projects, the state share is well over the minimum required Federal match.

Funds are allocated to the different program categories according to the following process, as illustrated in Figure 3.3.

- First, a maintenance budget is established which allows for continuation of the previous budget with an allowance for inflation and any system additions which would add to the cost of maintenance and operations. Remaining funds are applied to construction.
- The first draw on available construction funds is for Category A, consistent with the priority programming legislation. The Category A funding level is established based on a needs model which is targeted to maintaining the current system condition.
- The second draw on construction funds is for Interstate projects. The policy is to fund Category B at the level which will match Federal Interstate funds made available to the state. This includes both Interstate completion and Interstate 4R funds.
- The third draw from available construction funds is for Category H. The department's bridge programs are funded at a level which ensures that all Federal funds retained by the department are matched. Additionally, some bridge projects are undertaken requiring 100 percent state funds. The proposed level of funding for Category H is determined by a bridge needs model, which is based on a target of achieving a status quo over time so that bridge conditions do not decline on an overall basis.
- Special Category C projects are funded from the proceeds from 0.75 cents per gallon fuel tax applied to project bonds.
- Category C is allocated the remaining funds after budgets are set for the other categories. A Category C needs model is used to obtain a target funding level. However, since the other categories are funded first, achievement of the target funding level is heavily dependent upon the Legislature's willingness to provide the necessary funds.

Figure 3.3 WSDOT Program Funding Process



## County Road Administration Board (CRAB) Funding Programs

Funds available for the County Arterial Preservation Program and the Rural Arterial Program are established by the statutory distributions of revenues from motor vehicle fuel taxes. The Rural Arterial Program receives 1/3 of the one-cent tax on motor fuels (RCW 82.36.025) and 0.25 cents from the five-cent fuel tax (RCW 46.68) or a total of about 0.58 cents per gallon. The County Arterial Preservation Program is funded from 0.45 cents of the five-cent fuel tax.

## Transportation Improvement Board (TIB) Funding Programs

The Urban Arterial Trust Account program receives 1.21 cents of the 17-cent fuel tax (RCW 46.68.100) plus 1/3 of the one-cent tax (RCW 82.36.025) for a total of about 1.54 cents. The Transportation Improvement Account program is funded from 1.5 cents of the five-cent fuel tax (RCW 46.68).

## ■ 3.4 Overview of Programming Methods

This section provides a brief summary of the different steps of the programming process for each program category:

- Needs Analysis
- Fund Allocation (within categories)
- Project Identification
- Project Evaluation Criteria and Ranking

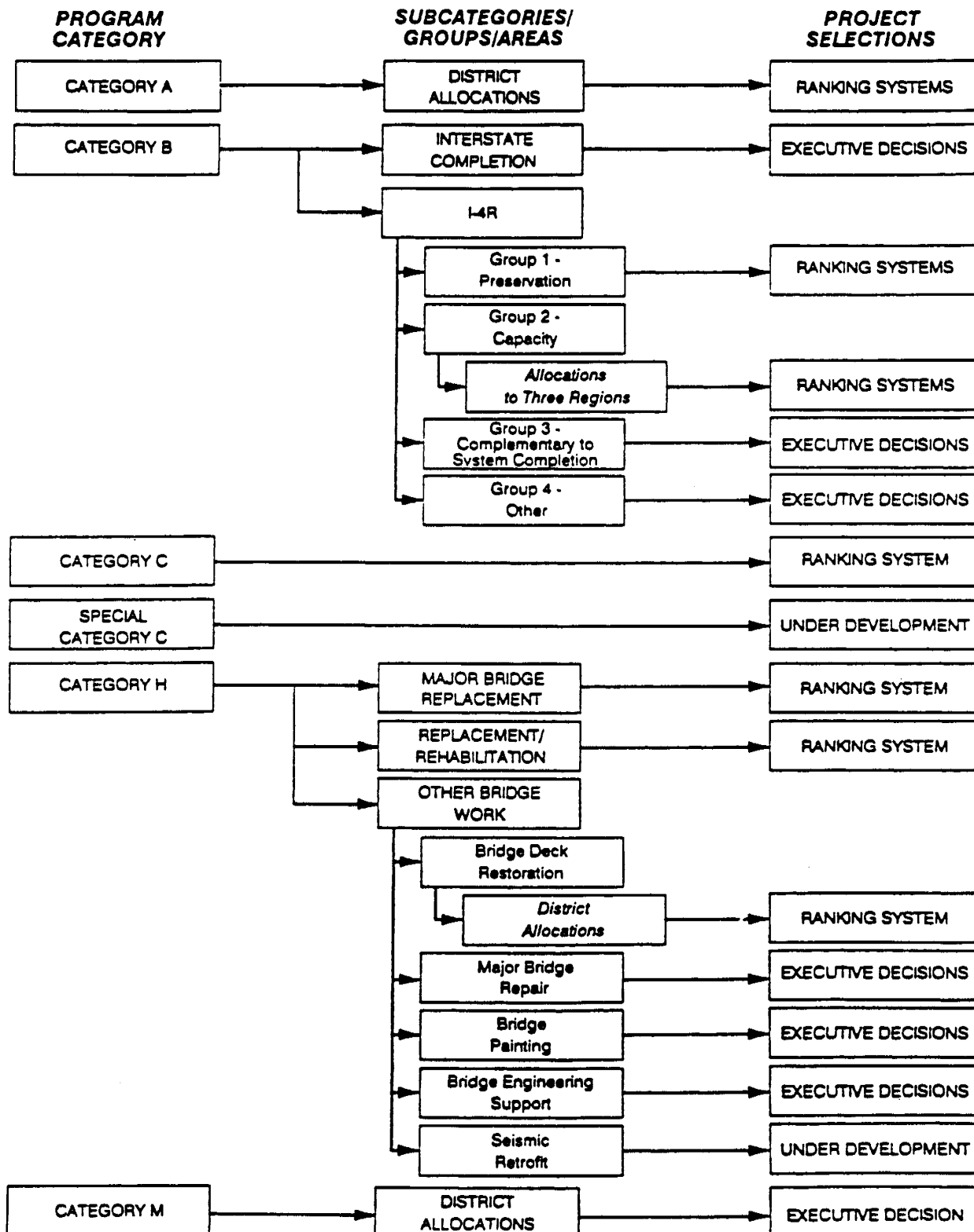
The overall structure of the WSDOT programming process is displayed in Figure 3.4.

## WSDOT Category A

### Needs Analysis

Preservation needs are estimated with a system-wide model which assesses the amount of work required to meet a target of maintaining pavements in their present condition with modest improvements to roadway geometrics and safety features. The Category A needs model was initially developed in 1981, and was adjusted in 1986. The 1986 model was reviewed in late 1989 and was found to be in need of further revisions to account for

Figure 3.4 Structure of WSDOT Programming Process





changes in cost factors and other assumptions. The department submitted a budget decision package for the 1991-1993 biennium which was intended to correct for the difficulties found in the 1986 Model. However, the request was not approved. Thus, the current Category A funding level is based on the results of the 1986 model, adjusted for inflation.

As the program is now structured, the Category A model calculates the required funds for a very diverse list of needs that are undertaken with Category A funds. This list is as follows:

- Resurfacing (seals and thin overlays)
- Pavement structural improvements
- Hazardous accident locations
- Traffic signal systems and intersection improvements
- Bridge deck protection (asphalt concrete pavement (ACP) with membrane)
- Roadway widenings (minor widening of narrow lanes and shoulders)
- Access control measures
- Bridge widenings (within the limits of a structural overlay project)
- Bridge rail upgradings
- Truck climbing lanes
- Miscellaneous items
  - Indirect project costs (e.g., Minority Affairs Office, portions of the construction engineering staff, and the Attorney General support staff)
  - Railroad crossing improvements
  - Rest area rehabilitation
  - Right-of-way plan update
  - Outdoor advertising (i.e., administration of controls on billboards and signs)
  - Unstable slopes (major cleanup and permanent repair)

- Technical training (National Highway Institute/FHWA)
- Training support
- Weigh stations (portable and permanent facilities and equipment)
- Property management
- Items associated with the Interstate System which are not eligible for Federal funds.

While the major types of needs are pavement condition and hazardous accident location improvements, as noted, a number of other items are paid for out of Category A. These items go beyond a strict interpretation of preservation work.

The Category A model does not determine needs on a project by project basis. Instead, it is a system level model which determines the amount of work to be accomplished statewide. To illustrate, the model is based on a plan to resurface a certain number of miles each biennium. Establishment of this target takes into account the average life of various pavement types, based upon findings from the Pavement Management System (PMS). Further, the plan defines the number of miles to be treated with structural overlays and the miles for which seals are to be applied. Also, it accounts for the proportion of seals which are programmed as thin overlays and those involving bituminous surface treatments (BST, or chip seals). For each treatment, an appropriate unit cost is applied to determine the amount of required funding.

This basic approach is employed regarding other project types included in Category A. The criteria employed by the model are presented in Table 3.1. The needs model is used for the purpose of overall budget estimation and allocation of funds to districts. Other than setting a budget target, it does not directly affect how funds are actually programmed for specific projects.

### **Category A Model Versus Pavement Management System**

The Department of Transportation has a rigorous Pavement Management System which identifies the time of needed improvements and the types of improvements required in order to achieve the most cost-effective pavement program.

The Category A Model does not directly utilize the Pavement Management System (PMS). Nevertheless, it does use information from the PMS regarding average lives for different types of pavements. On the basis of this information, the Category A Model establishes target levels for resurfacing which, in general, will achieve a relatively consistent number of lanes miles

Table 3.1 1986 Category A Model

Needs Category	Basis of Estimates
1. Resurfacing	Average miles requiring seals and overlays.
2. Traffic Operations and Safety	
A. Hazardous Accident Locations	Average number of locations to be corrected by minor improvements and by specific construction projects.
B. Traffic Signals	Average number of signals to be rebuilt and average number of new signals.
C. Intersection Improvements	Average number of intersections to be improved that are not addressed by other projects.
3. Bridge Deck Preservation	Average square feet of deck to be protected by ACP overlay and membrane.
4. Roadway Widening	Average miles that fail to meet 3R minimums and are economically feasible for widening or can be addressed by shoulder reconstruction.
	Average miles for which access control is to be purchased.
5. Bridge Widening	Average number of bridges that fail to meet 3R minimums and are economically feasible for widening.
6. Roadway Safety Improvements	Average miles that can be addressed by companion safety contracts or as a component of structural overlay projects.
7. Bridge Rail Retrofits	Average linear feet of bridge railings (by type) that do not meet AASHTO criteria.
8. Pavement Structural Improvements	Average miles with major or minor structural inadequacies.
9. Miscellaneous Items (e.g., rest area rehabilitation, unstable slopes, etc.)	Individual criteria for each item.

each biennium. This helps level out the peaks and valleys in District paving projects.

The Pavement Management System is used to help prioritize pavement needs, however, through the identification of three tiers of pavement condition (referred to as P-1, P-2, and P-3). These pavement condition groupings are gauged to the resurfacing targets in the needs models to maintain a relatively constant level of work from one biennium to another. Since the calculation of these pavement groupings is part of the Category A priority ranking, the details of this procedure will be presented in a later section.

### **Fund Allocation**

Category A funds are allocated to the six WSDOT districts on the basis of needs, with a small amount set aside for use by headquarters. District needs are estimated according to project type (resurfacing, hazardous accident locations, signals, etc.) The resurfacing component of each district's allocation is based on the statewide resurfacing target, and the distribution of lane miles by volume classification and pavement surface type by district. Similarly, other components of the allocation are estimated based on each district's share of the total needs.

Needs for resurfacing are based upon the Category A Model target of lane miles for each biennium, that is:

District 1	340
District 2	520
District 3	344
District 4	296
District 5	363
District 6	512
<b>Total</b>	<b>2,375</b>

Note that the distribution of 2,375 target resurfacing miles among districts is not the same as the P-1 miles in each district, although the statewide total of P-1 miles also is 2,375 lane miles per biennium. The department feels that, over the long run, the average number of P-1 miles in a district will approximate the lane miles in the Category A Model. However, in any given biennium, this is not true. Therefore, the policy regarding district allocations has a long-term perspective with the intent of reducing peaks and valleys in the district's work loads.

### **District Prerogatives**

While districts have some latitude in terms of how they utilize Category A funds, there also are certain guidelines that set limits on the amount of discretion that can be exercised. Regarding resurfacing projects, the Materials Laboratory sets the number of "Target Miles" for resurfacing in

each district. These targets reflect consideration of the Category A Model lane miles per district and the number of P-1, P-2 and P-3 miles derived from the Pavement Management System. Districts are required to accomplish  $\pm 10$  percent of the "Target Miles." This requirement limits the amount of discretion a district can exercise about the amount of funds spent on resurfacing. Nevertheless, the district can elect to use what it considers to be the best type of resurfacing. Some have elected to undertake costly resurfacings more frequently while others tend to use low cost treatments. Naturally, this affects future resurfacing needs in the districts.

Districts must address all hazardous accident locations contained in the Priority Array. Some of these locations may not be correctable by a project and some projects may be unreasonably costly. While all locations are addressed, projects are not selected for all locations. Districts are required to explain their decisions in the "Summary of Priorities" which is a computerized database, listing each location in the Priority Array and containing the districts decision about what should or should not be done. Safety needs that are not listed in the Priority Array may also be addressed in other project work.

### **Project Identification**

In even-numbered years, WSDOT prepares a priority array document, which identifies highway segments with deficient pavement conditions and hazardous accident locations. This document, which identifies problems or needs, is the primary basis for development of Category A projects.

Pavement condition surveys are carried out on the full state highway system every year. The results of these surveys are entered into the statewide pavement management system (PMS), which calculates a pavement condition rating, and predicts how pavement condition would be expected to deteriorate over the next three biennia. The pavement condition rating (PCR) ranges from 0 to 100 – where 0 represents a failed pavement and 100 represents a new pavement. Different PCR standards for resurfacing are used for different functional classes of roads and pavement types. The standards for asphalt and bituminous pavements range from PCR of 50 for an Interstate highway to 30 for a collector. The standard for portland cement pavements is 20 for all functional classes. Based on the PMS outputs and the standards for when different roads should be resurfaced, a determination of relative urgency for resurfacing is made for each pavement segment.

Hazardous accident locations are identified by analyzing accident records for the previous two-year period. An accident severity index is calculated for each highway segment based on the number of accidents per million vehicles weighted according to accident severity. Then, the severity index is compared to a threshold value called a "critical rate" which has been established on a statewide basis for each type of roadway. If the severity

index exceeds the critical rate, the segment is determined to be a hazardous accident location.

Other Category A projects (minor widenings, operational improvements) are identified by the districts. These kinds of projects are typically coordinated with pavement and/or safety projects.

### **Evaluation Criteria and Ranking**

The legislatively established priority criteria for meeting Category A needs are:

- Structural ability to carry loads;
- Capacity to move traffic at reasonable speeds without undue congestion;
- Adequacy of alignment and related geometrics;
- Accident experience; and
- Fatal accident experience.

Pavement resurfacing needs respond to the "structural ability to carry loads" criterion. Safety needs respond to the accident-related criteria. These two categories of needs are formally ranked and included in the state Priority Array.

Technical ranking procedures are not used with other types of Category A needs which address the remaining two criteria, such as traffic signals and intersection improvements, minor roadway widenings, or bridge decks and railings. Districts have discretion as to which of these needs are to be undertaken and how much of the district's Category A funds are to be used on them. Typically, these other needs account for a relatively small proportion of total expenditures because of the emphasis on pavement and safety needs.

The ranking methods for pavement and safety needs are briefly described below.

**Pavement Needs:** The number of lane-miles of pavements to be resurfaced in each biennium is fixed at 2,375 by the Category A needs model, as described earlier. Districts are required to resurface within 10 percent of their "Target Miles." To select which segments are to be resurfaced, priority rankings are established for pavement projects for different functional classes of roads within each district. While districts have some degree of discretion as to the particular segments they select (in order to allow for

project coordination and other factors), programming of pavement projects is generally based on the priority rankings.

The establishment of priority rankings begins by using the pavement management system to determine when each segment should be resurfaced. This determination is based on the current pavement condition rating, the PMS predictions of deterioration, and the resurfacing standards described above under Project Identification. Each segment is assigned a PMS rank which indicates the urgency of resurfacing.

Next, guidelines are established for which segments should be resurfaced in the next three biennia. The highest ranked 2,375 miles in the state are designated as P-1, which means that they are to be done in the first biennium. Using the same 2,375 lane-miles per biennium target, the next highest ranked set of sections is identified for the second biennium and designated as P-2. A similar process is followed to identify projects for the third biennium, which are designated as P-3.

The PMS rankings are then used to produce a priority rank for the Priority Array for each district and functional class of road. The Priority Array organizes pavement needs within each district and functional class by P-1/P-2/P-3 designation. The Priority Array is then used by the districts to guide selection of pavement projects.

**Safety Projects:** As described above under Project Identification, hazardous accident locations are identified by computing an accident severity rate (which reflects the number and type of accidents on a road section), and comparing it to an established critical accident rate for different types of roads. Priority rankings of hazardous accident locations are determined based on 50 percent of the severity rate and 50 percent of the difference between the section's accidents and the statewide threshold critical value. The Priority Array presents hazardous accident locations in the order of their severity rating values. All hazardous accident locations (where accidents exceed the threshold value) must be addressed by districts in the Category A program. However, this does not mean that a project is defined for every location, given that some hazardous accident locations may not be feasibly addressed by projects.

## **WSDOT Category B**

### **Needs Analysis**

Interstate completion needs are identified based on the remaining links to be completed on the designated Federal Interstate system. No formal needs estimates are made for Interstate 4R projects. The budget level for Category B is determined by Federal funding appropriation levels rather than needs estimates.

## Fund Allocation

Allocation of funds between Interstate completion and 4R subcategories is determined by Federal funding levels. Within the 4R subcategory, funds are allocated to four groups as described below (note that the sequence of fund distribution is not in the order by group number):

- **Group 1-Preservation:** A funding level is set so as to continue conditions at present levels.
- **Group 3-Interstate Completion-Related Projects:** These projects are conducted in conjunction with completion projects. Funds are allocated based on which completion projects will be carried out in the biennium.
- **Group 4-Other Projects** (such as rest area rehabilitation, landscape projects, weigh stations, drainage improvements): Funding levels for each biennium are set so as to address a reasonable portion of these needs so that over time priority needs will be addressed.
- **Group 2-Major Capacity Improvements** (similar to Category C for non-Interstate facilities): The remaining 4R funds are allocated to this group.

Capacity improvement funds (4R Group 2) are allocated to three regions of the state (east, west and Puget Sound) based on a formula which includes congested lane miles, population and vehicle miles traveled. No explicit geographic allocation is made for other types of Category B projects.

## Project Identification

Interstate completion projects are federally defined. Interstate 4R preservation projects are identified through a procedure analogous to that followed for Category A, and are included in the Priority Array. Other 4R projects are identified by WSDOT headquarters and district staff.

## Evaluation Criteria and Ranking

Interstate completion priorities are established based on executive decisions which take into account:

- System continuity;
- Importance in transportation network;
- Potential for congestion relief and accident reduction on existing highways;



- Ease of implementation (low cost, non-controversial); and
- Public support.

**Interstate 4R Preservation** projects are prioritized in the same way as Category A projects.

**Interstate 4R Capacity** projects are ranked on a statewide basis using a scoring system which considers level of service, traffic volume, traffic volume growth, district priority, volume/capacity ratio, accident rate and inclusion of a transit improvement. Districts initially select projects from the highest ranked projects on the statewide list, and final selections are made by WSDOT headquarters consistent with the regional funding allocations. WSDOT considers a number of factors in making the final selections:

- System continuity;
- People-moving capacity;
- Effect on mainline congestion; and
- Regional coordination.

**Interstate 4R Completion-related** projects are not prioritized independently, as they are undertaken in conjunction with Completion projects.

**Other Interstate 4R** projects are prioritized on the basis of executive decisions, and are not subject to any formal ranking procedures.

## WSDOT Category C

### Needs Analysis

A needs model is used to evaluate statewide needs for capacity improvements. The current model was developed in 1988, and determines the financial needs to achieve different targets of system performance. It is the current policy to set the target level so that the current system performance level is maintained. The Category C needs model yields projects directly, rather than problems or needs (as is the case with the Category A model).

The model identifies needs by identifying highway sections which are expected to fall below minimum tolerable traffic levels of service (LOS) given projected traffic growth rates over a 14-year period. LOS "A" through "F" represent various degrees of traffic flow quality, in declining order. LOS "A" represents very light, free flow conditions, while LOS "F" indicates stop-and-go conditions. Different LOS standards were

established for the Puget Sound Urbanized Area (LOS E), Other Urban Areas (LOS D), and Rural Areas (LOS C).

Those sections which are expected to fall below the minimum LOS standards, but which would be infeasible to widen due to environmental, social, and financial considerations, are eliminated from the needs estimate. The resulting list is termed the Maximum Plan. A less expensive list of deficiencies called the Weighted Average Plan was developed by eliminating some high cost projects, short segments, and marginal projects by substituting passing lanes in lieu of major widening where practical.

The Weighted Average Plan, which has been adopted, includes needs of between \$1.4 and \$1.6 billion (in 1988 dollars). Funding of this plan would reduce capacity deficient mileage from about 700 miles to approximately 600 miles over 14 years. However, the current programming process does not provide for a needs-based fund allocation to Category C. Category C receives only those funds available to WSDOT which remain after other program category needs are addressed.

### **Fund Allocation**

Category C funds are allocated to individual projects on a statewide basis.

### **Project Identification**

Road segments which meet the established minimum level of service criteria are eligible for consideration under Category C. Eligible projects are identified by the districts.

### **Evaluation Criteria and Ranking**

Category C projects are prioritized statewide on the basis of a cost-benefit rating system. Project benefits are represented by an Engineering Factor, which is calculated based on the estimated accident reduction (1-40 points), level of service improvement (1-40 points), and traffic volume (1-20 points). The Engineering Factor is then divided by the square root of the annualized project cost to obtain the Relative Rating, which is the basis for priority rankings.

## **WSDOT Special Category C**

The major characteristics of Special Category C match those of Category C, the difference between the two categories being the size (scope) of the project involved. Indeed, Special Category C is the only one of the six principal program categories with this characteristic. The effect of this distinction is to limit competition for available funds to only the three high cost projects assigned to Special Category C. Therefore, these projects

compete with each other and not with the large number of less expensive capacity needs in the state.

The priority ranking system for this special category is currently being developed. Factors to be used, as specified in legislation, are as follows:

- Total accidents,
- Fatality accidents,
- Congestion, and
- Route continuity.

These factors appear to be relevant for the types of projects included in Special Category C. Of course, the way in which they are used will influence the relative priorities of projects. The first three factors tend to measure the severity of problems to be addressed by the project, and the fourth criterion, route continuity, focuses on improvements in the quality of traffic services.

## WSDOT Category H

### Needs Analysis

WSDOT uses a needs model to determine the funding level required to achieve different target performance levels for the state's bridges. The model estimates the number of bridges which will require different kinds of improvements, distinguishing between timber, steel and concrete bridges by bridge length category. The 1990 model assumes that over a 20-year period, 11 major bridges will be replaced, and certain categories of deficiencies will be addressed (e.g., load restrictions, structural deterioration, inadequate vertical clearance, stream channel problems, etc.) Bridge deck deficiencies are to be corrected over a 10-year period. A bridge painting cycle of 10-14 years is also assumed. The 1990 model represents an upgraded needs level over the 1986 model to address a 20-year plan to preserve non-Interstate highway bridges.

Key elements of the WSDOT Category H model are summarized in Table 3.2.

### Fund Allocation

There are no statutorily defined fund allocation rules within Category H. However, WSDOT maintains three separate subcategories of work: Major Bridge Replacement, Replacement/Rehabilitation and Other Bridge Work. Other Bridge Work is in turn divided into bridge deck restoration, major

Table 3.2 1990 Category H Model

Needs Category	Criteria									
1. Major Bridge Replacement (HA)	Within 20 years, replace 11 major bridges:  (a) Not including Ebey Slough and other bridges with replacements costs well in excess of \$10 million.									
2. Bridge Replacement (HB)	Over next 20 years:									
A. Structural Deterioration	Address all structurally deficient bridges.									
B. Load Restrictions	Eliminate all load restricted bridges.									
C. Inadequate Vertical Clearance	Replace or modify all steel trusses with maximum vertical clearances < 15 feet 6 inches.									
D. Stream Channel Problems	Replace all bridges susceptible to serious damage due to scour or channel migration.									
E. Narrow Bridges	Replace all bridges which can not be feasibly widened in Category A which fail to:  (a) Meet 3R standards on all Design Standard and 3R routes.  (b) Are less than 20 feet wide on all Maintain Only routes.									
F. Timber Bridges	Replace all timber bridges.									
3. Major Bridge Repairs (HC)	Perform corrective work that cannot be accomplished by maintenance.									
4. Bridge Deck Restoration (HC)	Correct deck deficiencies over 10 years.									
5. Bridge Painting (HC)	Repaint steel bridges on the following bridge cycle: <table><tr><td></td><td>West of Cascades</td><td>East of Cascades</td></tr><tr><td>Steel truss</td><td>10 years</td><td>12 years</td></tr><tr><td>Steel girders</td><td>12 years</td><td>14 years</td></tr></table>		West of Cascades	East of Cascades	Steel truss	10 years	12 years	Steel girders	12 years	14 years
	West of Cascades	East of Cascades								
Steel truss	10 years	12 years								
Steel girders	12 years	14 years								
6. Engineering Support	Meet inspection, testing, bridge management system, research and other requirements.									
7. Seismic Retrofit	Get program underway.									

bridge repair, and bridge painting. Bridge repair funds are allocated to districts based on needs.

### **Project Identification**

A screening process is used to identify the top 80 candidate replacement/rehabilitation projects. This process involves determination of eligibility for Federal Highway Bridge Replacement and Rehabilitation Program funding. Bridges with a Federal sufficiency rating less than 80 are eligible for rehabilitation; those with a sufficiency rating less than 50 are eligible for replacement. Districts may make additional nominations for bridges not included in the top 80 candidates.

Bridge deck restoration candidates are identified based on deck condition information collected as part of inspections. Major bridge repair and bridge painting projects are identified by the WSDOT Bridge Condition Unit and by districts.

### **Evaluation Criteria and Ranking**

These are three subcategories within Category H. These are Major Bridge Replacement (HA), Replacement/Rehabilitation (HB) and Other Bridge Work (HC). The HA and HB subcategories are basically the same except for the cost involved, with HA comprising projects with costs over \$5 million. Therefore, these two subcategories will be treated together in the following discussion.

Because subcategory HC involves several different types of projects, the discussion will treat each major type separately.

**Bridge Replacement/Rehabilitation (HA and HB).** A multiple step process is used to establish priorities for bridge replacement and rehabilitation projects. The first step is to determine eligibility for Federal Highway Bridge Replacement and Rehabilitation Program funding. This is done using the Federal sufficiency rating formula because it is the mechanism used for determining funding eligibility. The factors and weighting used are as follows:

Factor	Criteria	Maximum Points
Structural Adequacy and Safety ( $S_1$ )	Superstructure Rating Substructure Rating Culverts Rating Inventory Rating	55
Serviceability and Functional Obsolescence ( $S_2$ )	Lanes on Structure Average Daily Traffic Approach Roadway Width Structure Type, Main Bridge Roadway Width Vertical Clearance Deck Condition Structural Evaluation Deck Geometry Under Clearance Waterway Adequacy Approach Roadway Alignment Defense Highway Designation	30
Essentially for Public Use ( $S_3$ )	Detour Length Average Daily Traffic Defense Highway Designation	15
Special Reductions ( $S_4$ )	Detour Length Traffic Safety Features Structure Type, Main	-13

The sufficiency rating is computed by the formula:

$$SF = S_1 + S_2 + S_3 - S_4$$

The Federal sufficiency rating approach is quite comprehensive in scope and the number of criteria that are used. Also, average daily traffic and defense highway designations are used in two categories: (1) serviceability and functional obsolescence, and (2) essentially for public use. Likewise, detour length is used in two categories: (1) essentially for public use, and (2) special reductions.

The Federal sufficiency rating is mandated for determining eligibility for funding with Federal Bridge Replacement Rehabilitation funds. Bridges with sufficiency ratings less than 80 are eligible for rehabilitation while those with sufficiency ratings less than 50 are eligible for replacement.

WSDOT uses the Federal sufficiency rating to identify the top 80 candidate bridges. In doing so, structural deficiencies due to bridge deck contamination are deleted because these are addressed in WSDOT's Bridge Deck Program. Field reviews and office reviews are then conducted, followed by meetings in each district. At the district meetings, the districts can nominate candidate projects to be added to the list of 80 bridges.

Final screening then is conducted to identify the top 25 replacement candidates. This is done using a priority ranking formula which addresses bridge needs in the state of Washington, as distinguished from the Federal sufficiency rating. The state formula takes the general form:

Rating Factor =  $0.1 \times \text{Structural Adequacy} \times \text{Serviceability/Functional Obsolescence} \times \text{Importance}$ .

The three components in the formula are described below:

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Structural Adequacy	Superstructure Condition Substructure Condition Deck Condition Structural Deficiency Factor
Serviceability/Functional Obsolescence	Under Clearance Adequacy Overhead Clearance Adequacy Waterway Adequacy Ratio of curb-to-curb width to minimum required width
Importance	Service level factor (based on Level of Development Plan) Urgency (based on year of need)

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While the Rating Factor formula is somewhat complex, it does recognize a wide range of considerations that are relevant to bridge replacement and rehabilitation priorities. Testing of the formula revealed the following:

- Deficiencies in structural adequacy elements have a significant, but not overwhelming, impact on results.
- Differences in serviceability/functional obsolescence factors relating to vertical clearances and waterway adequacy have similar impacts on results.

- If a bridge is not an overpass of another road or is not a truss type, it typically will receive a lower priority than a bridge that is an overpass, a truss type, or both.
- Width deficiencies tend to get less emphasis than vertical clearance and structural features.
- While service levels (based on the Level of Development Plan) are recognized, this is less important in the results than are deficiencies in vertical clearance and structural features.
- The year of need plays a minor part in the priorities (a difference of five years has about the same effect as a change from one level of development to another).

**Other Bridge Work (HC).** There are five subclassifications of programs under this category.

**Bridge Deck Restoration** priorities are computed using the following process:

- Based on deck condition survey data;
- Prioritized into groups according to percent deck delamination, percent chloride contamination, and ADT;
- Group 1 (highest priority) and Group 2 listings are sent to each district;
- Funds are allocated to each district based on needs (by Group 1 and 2 deck areas);
- Districts program from Group 1 and 2 listing considering other scheduled work on or around each route.

The process is needs driven and this is considered to be appropriate for this type of project.

**Major Bridge Repair** priorities are set by the following process:

- Preliminary list of needs is developed by the Bridge Condition Unit;
- District requested needs are added;
- Meetings are held with each district to identify priorities based on urgency, condition, and schedule;
- Selected projects are identified in the program instructions to each district.



Given the nature of these projects, reliance on the professional judgements of qualified bridge engineers is not inappropriate.

**Bridge Painting** priorities also are based on engineering judgements related to the need for and urgency of painting. The process is as follows:

- Painting needs are identified during bridge inspections;
- Prioritized by urgency and condition;
- Projects are identified in the program instructions to each district.

Both Interstate and non-Interstate structures are programmed in the Bridge Painting Program.

This approach seems quite reasonable and a more complex prioritization approach does not seem warranted.

The **Engineering Support** element of Subcategory HC encompasses bridge inspection and testing activities and bridge management and research. Such activities do not lend themselves readily to prioritization processes.

The **Seismic Retrofit** program has only recently been undertaken. Funds totalling \$6.5 million were appropriated by the Legislature for this purpose in the current biennium as start-up funds. Depending on the scale of service retrofit needs, consideration of a prioritization process may be warranted so that the most urgent needs can be addressed as priority projects.

## WSDOT Category Z

### Needs Analysis

WSDOT District Local Programs Engineers assist local agencies to evaluate transportation needs and identify opportunities for Federal and state project funding. There is no statewide needs model for Category Z analogous to those used for Categories A, C and H. However, there is a systematic statewide bridge needs analysis process to determine eligibility for Federal bridge funding. Needs analysis for other types of local Federal-Aid projects are conducted by local jurisdictions.

### Fund Allocation

Federal-Aid funds administered through Category Z are allocated in a variety of ways:

- Federal-Aid Urban Systems (FAUS) funds are allocated to cities and counties on the basis of urban population. All of Washington's FAUS funds are allocated to local jurisdictions. A 16.87 percent local match is required. In the urban portion of King County, FAUS funds are allocated by the King Subregional Council (SRC) of the Puget Sound Council of Governments (PSCOG). In Kitsap County, the Kitsap County Subregional Transportation Committee receives and distributes the FAUS allocation for all local agencies within the county. Cities and counties (with the above exceptions) which are over 5,000 in population receive a direct allocation. The Pierce and Snohomish County Subregional Councils receive allocations for agencies less than 5,000 in population, and determine which projects will be funded. Remaining agencies in other counties under 5,000 in population compete for FAUS funds on a statewide priority basis.
- Federal-Aid Secondary (FAS) funds are allocated to counties on the basis of FAS system mileage. Twenty percent of the state's FAS apportionment is retained for the state highway system.
- Bridge Replacement and Rehabilitation (BR) funds for local jurisdictions are allocated on a project-by-project basis. Fifty percent of the state's BR apportionment is allocated to local jurisdictions.
- Hazard Elimination (HE) funds are allocated on a project-by-project basis. Local jurisdictions are allocated 60 percent of the state's apportionment.
- Railway-Highway Grade Crossing Program (RR) funds are allocated on a project-by-project basis. Local jurisdictions are allocated 80 percent of the state's apportionment.
- Emergency Relief Program (ER) funds are available in the event of natural disasters or catastrophic failures. These funds are made available on the actual cost to restore damaged Federal-Aid facilities.

### **Project Identification**

The Local Programs Division assists local agencies to identify projects eligible for Federal and state assistance. FAUS and FAS projects are identified entirely by local jurisdictions. Federal BR projects are identified based on the state of Washington Inventory of Bridges and Structures (SWIBS). Candidate projects for HE and RR funds are proposed by local jurisdictions. Each Federal-Aid program has eligibility restrictions as follows:

- FAUS: Projects aimed at improving transportation service to major activity centers within urban areas. Roadway projects must be located on the Federal-Aid Urban System. Eligible roadway projects include

construction improvements, traffic signals, bus lanes, and pedestrian improvements. Bicycle and pedestrian facilities, transit facilities (including bus purchases), and park-and-ride facilities are also eligible for FAUS funds.

- **FAS:** Construction or reconstruction of rural roads on the Federal-Aid Secondary System.
- **BR:** Replacement or rehabilitation of bridges on public roads. Removal of a deficient structure and provision of alternative access at or less than the cost of replacement is also eligible.
- **HE:** Projects on public roads to improve locations which constitute a danger to vehicles or pedestrians as shown by frequency of accidents. Eligible projects include intersection improvements, alignment changes, and installation of protective devices.
- **RR:** Projects to reduce fatalities, injuries, and damages through improved railway-highway crossings including installation of signs and markings, train-activated warning devices, and illumination.
- **ER:** Projects to repair or reconstruct roadways and bridges on Federal-Aid systems which have suffered serious damage as a result of natural disasters or as a result of catastrophic failure from any cause. Eligible expenditures include preliminary engineering, right-of-way, and permanent and emergency construction to restore essential travel, protect remaining facilities and restore facilities to predisaster conditions. The Governor must declare an emergency for these funds to be approved.

### **Evaluation Criteria and Ranking**

The WSDOT Local Programs Division prioritizes city and county project submittals for Federal funding for those programs which involve state-wide, project-by-project allocations (BR, HE, RR). Specific methods for different programs are as follows:

- **FAUS:** Recipient agencies are responsible for prioritizing and selecting projects. The Kitsap County Subregional Council is responsible for prioritizing FAUS projects for all agencies in the county. The Pierce and Snohomish Subregional Councils prioritize FAUS projects for agencies under 5,000 in population, and WSDOT prioritizes projects for agencies under 5,000 in population in the rest of the state. The FAUS funded projects must be on the six-year program approved by Metropolitan Planning Organizations (MPOs). However, MPOs are not generally involved in establishing project priorities.
- **FAS:** Projects are prioritized and selected by county officials through a variety of local methods.

- BR: Projects are evaluated and prioritized statewide based (in part) on bridge inspection results evaluated by the Bridge Replacement Advisory Committee which is composed of three representatives each from the counties, cities, and WSDOT.
- HE: Project submittals are prioritized statewide based on a cost-benefit ratio.
- RR: Projects are prioritized and selected in cooperation with the Washington Utility and Transportation Commission staff.
- ER: Funds are awarded on an as-needed, emergency basis.

## WSDOT Administrative Costs

The costs of general DOT administration, research, planning, etc. are tallied within several administrative categories: e.g., D1, D5, M1, S1, S2, T1, and T2. (It is these administrative categories that are referred to in the first footnote to Figure 3.1.) Besides these general administrative functions, however, there are certain activities associated with the construction program itself whose costs are carried within the construction-related categories. These costs fall into three basic groups:

- General fund activities that are included in the "miscellaneous" component of the current Category A needs model: e.g., indirect project costs (for support by the Attorney General, Minority Affairs Office, etc.), right-of-way plan updates, administration of outdoor advertising (billboards), NHI/FHWA technical training programs, training support, WSDOT property management, etc.
- Administrative work orders that are charged back to projects in all construction categories.
- Some administrative and research-type expenditures that may be included in preliminary engineering for a project.

These costs reflect overheads borne by the construction program that are dealt with in the recommendations in Volumes I and IV of this report series.

## **County Road Administration Board (CRAB) Programs**

### **Needs Analysis**

Needs analysis is not an integral part of the ongoing statewide programming process for the Rural Arterial Program (RAP) or the County Arterial Preservation Program (CAPP). These programs are funded from a legislatively set share of the fuel tax, and are intended to assist counties in addressing arterial preservation and improvement needs.

Requirements for the development of six-year plans for rural arterial projects, and for the use of pavement management systems for guiding CAPP expenditures promote the practice of needs analysis at the local level.

### **Fund Allocation**

RAP funds are allocated to five different regions of the state through a formula based on rural land area and miles of rural collectors. Procedures established for the Northeast Region state that no county shall receive over 30 percent of the regional allocation, and that 10 percent of funds be used as the local match for Federal bridge replacement funds, 45 percent for reconstruction projects, and 45 percent for resurfacing, restoration and rehabilitation projects. The Puget Sound, Northwest, Southeast and Southwest Regions also restrict the amount or percentage of funds which may be allocated to any single county. CAPP funds are distributed to individual counties based on the share of paved arterial lane miles.

### **Project Identification**

Rural collectors with capacity, structural, geometric or safety-related deficiencies are eligible for RAP funding. Projects are identified by the counties.

For the CAPP program, pavement management systems must be used to track the condition of all paved arterials, and pavement condition thresholds must be used to determine appropriate preservation actions.

### **Evaluation Criteria and Ranking**

For RAP projects, separate priority rating systems are defined for each of the five regions. Four of the five systems assign points based on traffic volumes, accidents, structural condition, geometrics, and other factors which vary. Weights assigned to each factor vary from region to region. The Northeast Region is different from the others in that an initial apportionment of funds is made between bridge projects, reconstruction projects, and 3R projects. Then, a priority formula is applied which is based on a service rating and a condition rating. Each county submits

eligible projects to CRAB, and funds are allocated to the highest ranking projects within each region.

For the CAPP program, counties receive a direct funding allocation, and must use a pavement management system to identify and select eligible projects. Counties must also submit an annual program of pavement preservation projects to CRAB.

## **Transportation Improvement Board (TIB) Programs**

### **Needs Analysis**

The TIB assesses statewide six-year arterial improvement needs by comparing existing arterial conditions to minimum tolerable conditions which have been defined to determine eligibility for Urban Arterial Trust funds. Minimum improvement costs are determined for deficient arterials based on minimum design standards for different classes of arterials. Current needs are estimated at \$1.58 billion. A similar needs analysis is not conducted for the Transportation Improvement Act program. However, the TIB informally assembled a needs list which included 530 projects totaling about \$2.4 billion.

### **Fund Allocation**

The Urban Arterial Trust Account (UATA) program is divided into an urban program and a rural program. For the urban program, funds are apportioned to five regions based on each region's share of total urban area population, non-Interstate vehicle miles, and urban arterial preservation needs. For the rural program, funds are divided based on relative population percentages within each region.

The Transportation Improvement Act (TIA) program is divided into an urban program which receives 87 percent of funds, and a small cities program, which receives the remaining 13 percent. Urban program funds must be distributed so that minimum regional distribution targets are met. A minimum of 30 percent of the funds must go to the Puget Sound Region, and the East and West Regions must each receive at least 15 percent of the funds. Small city funds are distributed based on relative small city population within each of the three regions.

### **Project Identification**

Local jurisdictions identify projects which meet UATA and TIA program criteria as part of their six-year program development process. For UATA, jurisdictions submit inventory information on their arterials, and a priority array is prepared which lists for each region and functional class the operating speed, volume/capacity ratio, accident rate, pavement condition

rating, and road width. Deficiencies are determined by comparing these items to minimum tolerable conditions which are defined for each region.

### **Evaluation Criteria and Ranking**

UATA program evaluation criteria are the same as those established for WSDOT Categories A and H. Using the priority array, projects are divided into three priority groups based on the number of deficiencies and the traffic level. Within each functional class and group, a priority rank is assigned based on the number of deficiencies and the weights assigned to each type of deficiency. The priority criteria are heavily weighted to the selection of projects with either a deficient operating speed or unacceptable volume/capacity ratio.

TIA projects are scored and ranked according to the extent of multi-agency participation (20 points), multimodal solutions (20 points), congestion and safety improvements (30 points), economic development (20 points) and magnitude of local match (30 points).

## **■ 3.5 Programming Results and Construction Projects**

The results of the programming process were compared to the proposed highway construction program for the 1991-93 biennium, to determine to what degree the list of construction projects conforms to the programming results, and to identify and explain differences between the output of the programming procedures and the actual projects to be undertaken. This analysis was performed for the non-Interstate construction categories (A - Preservation, C - Non-Interstate Capacity Improvements, and H - Non-Interstate Bridge Replacement and Rehabilitation).

The results of this analysis are summarized below. In reviewing these findings, it is important to bear in mind that the results of the programming process for Categories A and H are expressed in terms of needs, deficiencies, or problems in the Priority Array, whereas the results for Category C are expressed directly as a list of projects.

- **Category A projects:** Overall, 87 percent of the Category A projects in the 1991-93 construction program were traced to the current Priority Array. Thus, there is substantial agreement between the two lists, although the result varies somewhat by district. This estimate is also conservative, in that safety work is a component of most projects, regardless of whether a deficiency is identified in the Priority Array.
- Several factors account for the differences between the Priority Array and the construction program listings:

- Some pavement and safety projects in the construction program were included in earlier priority arrays.
  - Some pavement projects address needs that are not accounted for in the Priority Array (e.g., surface rutting, roadway flooding).
  - Some safety projects resulted from external considerations: e.g., response to new traffic patterns and public pressure that led to an intersection modification; inclusion of a project from the district's priority list that took advantage of available local funds.
  - Safety projects may be performed in conjunction with construction work in other categories (e.g., Category C), and be identified by these other categories rather than as a safety project.
- WSDOT's explanations of differences between the Priority Array list and the construction program list for Category A are generally reasonable, and indicate flexibility in adjusting program results. What would be more desirable is a more effective communication of changes that occur in translating programming needs, deficiencies, or problems into construction projects, and tracking project evolution.
  - **Category H projects:** 63 percent of bridge projects statewide can be traced to the current Priority Array. At least some of this discrepancy is due to projects now being performed that were listed in earlier priority arrays. As with Category A, more effective communication of how the Priority Array translates into project definition would avoid uncertainty on this point.
  - **A revised programming approach** should address this communication problem observed in Categories A and H by providing a clearer, **two-way** linkage between the Priority Array and the construction program list. While detailed adjustments to the Priority Array now are noted in a document entitled "Summary of Priorities for Highway Development," there is no overall assessment of program composition and the impacts of these changes thereto. Furthermore, the Summary of Priorities addresses the Priority Array; it gives no information on projects that are identified outside the priority process, or that have arisen from earlier priority arrays. A projects-based reconciliation is needed, as well as the one now applied to the Priority Array.
  - **Category C projects:** Since the prioritization of non-Interstate capacity improvement projects yields a list of projects directly, the linkage between programming results and the construction project list is much more clearly defined. Furthermore, adjustments between the prioritized, programmed list and the ranked list of construction projects



presented to the Legislature are identified explicitly in the construction program.

- A total of 142 projects were prioritized by the programming process. Of these, 47 were submitted to the Legislature as projects to be funded, and 43 were included on the planned projects list.
- Of the 47 funded projects, 32 had a priority ranking in the range of 1 to 47. This means that in 15 of the top-rated 47 slots, adjustments were made in the priority ranking by the programming process to compose the construction program list. These adjustments result for two basic reasons, discussed below.
- The more common adjustment is that projects are effectively deferred by the district's request to move a project to the planned projects list. This adjustment is made in cases where project preparatory work (e.g., right-of-way acquisition, negotiations, hearings, etc.) will cause the start of construction to fall beyond five to six years in the future. The effect of this adjustment is to move lower priority projects onto the funded projects list (i.e., in the current biennium, projects ranked lower than 47th on the priority list).
- Another adjustment is that projects are moved up on the list because their priority has effectively been enhanced. For example, a project that has gained funding from other sources after its priority was computed in the programming process (e.g., from local application of TIB money) has an effectively lower cost to WSDOT. Its reprioritization using the Category C formula will therefore increase its relative standing. Such prioritizations are explicitly noted in the construction program list.

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## **4.0 Evaluation of the Programming Process**

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# 4.0 Evaluation of the Programming Process

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## ■ 4.1 Evaluation Framework

In Section 1.1 of this report, a number of evaluation issues were presented for Washington's programming and prioritization process. These issues have been organized according to five major aspects of the programming process: (1) policy direction, (2) program structure, (3) needs analysis and funding allocation, (4) project identification and prioritization and (5) program performance measurement. The following five sections of this chapter address each of these areas in turn:

- **Policy Direction:** Is the current process resulting in projects which are consistent with adopted policy objectives? Is policy direction for the process sufficient to ensure responsiveness to objectives?
- **Program Structure:** Do the categories used for programming provide a reasonable structure for priority setting and measurement of accomplishments? Does the program structure result in undesirable biases towards (or against) particular types of projects? Is it adaptable to changes in policy and/or state and Federal funding programs?
- **Needs Analysis and Funding Allocation:** Is the basis for fund allocation among the different categories appropriate? How do geographic distribution considerations enter into fund allocation process? What is

the influence of Federal and state revenue matching policies on the types of projects which are emphasized?

- **Project Identification and Prioritization:** Does the process support identification of a wide range of alternatives, including low cost options and operational strategies? How do service and design standards affect the outcome of the programming process? Do priority methods result in biases or inconsistencies? Do the methods adequately provide for state and local project coordination?
- **Program Performance Measurement:** Does the process include an evaluation of what the program is achieving with respect to stated policy objectives?

## ■ 4.2 Policy Direction

**Issue #1: Is the current process resulting in projects which are consistent with adopted policy objectives?**

The current WSDOT highway process produces results which are reasonably consistent with the more traditional objectives set for highway programs. It provides a mechanism which addresses:

- Goals for protecting the large investment of public and private funds spent on highway programs;
- Goals for protecting the safety of the public; and
- Goals for mobility for people and goods.

However, the overall process is not as strong in formal support for other goals which have emerged in recent times and which extend beyond the traditional roles for highway transportation:

- Encouragement of efficient transportation modes;
- Support for economic development;
- Growth management;
- Energy conservation;

- Environmental protection; and
- Intergovernmental coordination.

In order to effectively address these latter issues, programming decisions must be strongly tied to a broader transportation, land use, and environmental planning process.

CRAB administers the Rural Arterial Program (RAP) and the County Arterial Pavement Preservation Program (CAPP). Objectives for system preservation and mobility are strongly supported by the overall process whereby RAP projects are prioritized, although the five regions of the state give different levels of emphasis to different criteria. The process also supports regional and local planning activities. It does not directly address other objectives. CAPP provides funds for pavement related purposes. Consequently, it strongly supports objectives for structural preservation. Also, requirements for counties to use pavement management systems in determining where to spend those funds supports objectives for local planning. Because of the nature of this program, it does not directly relate to other objectives.

The Urban Arterial Trust Account (UATA) and Transportation Improvement Account (TIA) are the primary sources for funding Transportation Improvement Board (TIB) projects. Enabling legislation for TIA funded projects requires project selection consistent with state, regional and local transportation plans (RCW 47.26). Consistent with this legislation, the prioritizing criteria described by the TIB for TIA projects takes into account:

- Projects which include more than one agency;
- Projects that utilize multimodal solutions (transit, HOV, rail);
- Improvements to facilitate economic development or growth; and
- Percentage of local matching funds.

Therefore, the established programming and prioritization criteria are quite responsive to policy and program objectives for governmental cooperation, access to other modes, personal mobility and leveraging of financial resources. In its current form, the process does not directly address other objectives, including growth management.

The programming and prioritization process for projects funded with UATA monies is well structured, recognizes regional differences and values, and provides a rational basis for project selection. However, the methodology falls short in being fully responsive and consistent with all policy and program objectives. Ranking criteria are heavily weighted to

give priority to existing facilities with deficient operating speeds and volume/capacity ratio. Identified deficiencies in personal mobility are not given much weight in the ranking criteria, and program objectives related to economic opportunity, environmental protection/energy conservation, transportation finance and interjurisdictional coordination/cooperation are given little or no recognition in the formalized prioritizing procedure.

**Issue #2: Is policy direction for the process sufficient to ensure responsiveness to objectives?**

Preservation, safety, and careful allocation of scarce resources are clearly emphasized in the State Transportation Policy Plan, highway programming legislation, and WSDOT planning documents. The emphasis on preservation is made very clear by legislative requirements for allocation of funds to preservation before new capacity projects. The WSDOT Level of Development Plan, and the establishment of the RAP and UATA program eligibility criteria at the local level, result in clear emphasis on higher functional classes of roads.

Support for other policy objectives such as air quality, energy conservation and growth management is less explicit in the policy guidance specifically directed at the programming process. More direct policy guidance on these objectives should be integrated into the state highway programming process.

## ■ 4.3 Program Structure

**Issue #1: Do the categories used for programming provide a reasonable structure for priority setting and measurement of accomplishments?**

The four major WSDOT state highway capital program categories (A-Preservation, B-Interstate, C-Non-Interstate Capacity, and H-Bridge) collectively address many of Washington's most pressing transportation needs, and generally facilitate setting of priority for preservation over new capacity, making full use of Federal Interstate funding, and ensuring progress on bridge work. However, there are a few aspects of category definition that detract from the ability to establish consistent priorities and measure accomplishments with the current structure.

First, the types of projects which are funded under each category do not consistently reflect the stated category objective. For example, different types of bridge work are included not only in Category H, but also in A, B

and C. Category A, which is titled Preservation, includes safety projects and minor capacity work as well. Category B was established to include Interstate system projects, but Category H also includes painting of steel bridges on the Interstate System.

Second, having one category based on a funding source (B), one based on a facility type (H), and the others based on a type of work (A,C) tends to complicate the setting of consistent priorities and comparison of accomplishments for the different categories.

Finally, there are a number of policy objectives such as economic development and energy conservation which are affected by actions in all of the different categories. This makes it difficult to assess program achievements and resulting system performance in these areas. Establishing a program structure such that each critical policy objective is addressed by primarily one category would facilitate program responsiveness to policy. It is not necessary to establish a separate category for each policy objective – a single category could address multiple objectives.

**Issue #2: Does the program structure result in undesirable biases towards (or against) particular types of projects?**

The program categories do have the effect of emphasizing preservation over capacity projects, Interstate capacity over non-Interstate capacity projects, and bridge projects over (non-Interstate) highway capacity projects. These are intentional areas of emphasis. However, the legislatively-established funding priority for Category A creates the tendency for inclusion of work into this category wherever possible.

Projects aimed at objectives such as economic development, transportation demand management, or use of high occupancy vehicles are not explicitly supported by the category structure, and therefore there is no assurance that these projects will receive emphasis to the extent desired by state transportation policy.

**Issue #3: Is the program structure adaptable to changes in policy and/or state and Federal funding programs?**

The anticipated increases in Federal funding program flexibility in the new Surface Transportation Act, together with a winding down of Interstate Completion projects will diminish the need for a separate Category B. Revising the definition of program categories to be based solely on type of project or facility as opposed to outside funding programs will increase the flexibility of the state's program structure.

## ■ 4.4 Needs Analysis and Funding Allocation

### **Issue #1: Is the basis for fund allocation among the different categories appropriate?**

Priority programming legislation establishes the basis for fund allocation across categories. This ensures that certain objectives are addressed. However, it does not easily allow or encourage shifts in funding among categories to reflect changing priorities and new objectives.

Allocation of funds to Categories A (Preservation), C (Non-Interstate Capacity) and H (Bridges) are based on needs estimates; allocation to Category B (Interstate) is based on matching Federal funds. The evaluation of the needs models and allocation methods has yielded the following observations:

- The current procedures for revision of program category budgets in response to changing needs do not clearly distinguish between optional items and changes in cost factors or inventory items which are not controllable. For example, the Category A Needs model was reviewed in 1989 and found to be in need of further revisions in order to fully account for all of the needs which are financed through Category A. WSDOT submitted a Budget Decision Package for the 1991-1993 Biennium which was intended to correct the deficiencies in the model. Changes requested in the Budget Decision Package were to correct inventory assumptions and increase average cost assumptions for certain types of projects for reasons unrelated to inflation (e.g., new methods). However, this was not approved, with the effect that Category A is regarded by WSDOT as underfunded despite its status as the first priority for funding. A different approach that would facilitate the budget process would be to formulate budget decision packages based on identifying that portion of needs which could be met for different funding levels (assuming current inventory and cost factors as a given).
- The Category A model establishes a constant target number of lane-miles for pavement resurfacing each biennium which is based on average lives for different types of pavements rather than actual pavement conditions measured in the field. This approach is intended to maintain a relatively constant level of work each biennium, and to maintain, over the long run, the current average network pavement condition. It should be recognized, however, that this approach results in an allocation of funds to Category A as a whole, and to individual districts which may not necessarily reflect the relative urgency of resurfacing needs vs. other needs, or the relative severity of pavement conditions in different districts. While it is generally understood that



actual pavement performance is tracking well with the intent to preserve the current system condition, a fund allocation method which was more directly tied into current pavement conditions would be a more effective way to manage pavement resurfacing investments.

- WSDOT has a fairly rigorous Pavement Management System (PMS), which is used to identify the most urgent pavement resurfacing needs in each Biennium based on up-to-date condition measurements, resurfacing standards and models of pavement deterioration. However, the number of lane-miles to be resurfaced is fixed by the needs model, and is not determined by the PMS. The capabilities of the PMS could be more fully utilized as an integral part of the needs assessment and budget allocation process.
- For Category B, the state matches Federal-Aid but does not go beyond this level. This policy appears to be reasonable for Interstate completion projects, but may be questionable with respect to other (4R) projects on the Interstate system. There are legitimate questions as to whether the current funding level is adequate, too high, or too low in comparison with funding for non-Interstate highways. A needs analysis comparable to that performed for Category A is not conducted to determine the amount of funds required in order to maintain the status quo on the Interstate system. The level of investment on Interstate is based primarily on Federal funding levels.
- The Category B allocation method should be reexamined in the context of the new Intermodal Surface Transportation Efficiency Act.
- The Category C model establishes needs estimates based on different minimum tolerable levels of traffic service for the Puget Sound Urbanized Area, Other Urban Areas, and Rural Areas. The intent of this is to reflect different perceptions of traffic conditions, availability of multimodal solutions, and feasibility of achieving traffic flow improvements in different areas. Rather than establishing fixed level of service standards for different areas, it would be useful to explore the relative costs of achieving different level of service standards in different geographic areas.
- The needs estimate of the Category C model is not necessarily used as the basis for allocating funds to Category C, since Category C receives only those funds available to WSDOT which remain after other program category needs are addressed. As a result, it is difficult to characterize Category C accomplishments.
- The 1991-1993 funding level for Category H is short of the amount estimated in the 1990 needs model. This implies that this program is currently underfunded.

**Issue #2: How do geographic distribution considerations enter into the fund allocation process?**

Revenue allocation and priority methods for the state highway system distribute preservation funds to districts in a manner which is based primarily on physical road characteristics or need. These methods tend to achieve a more even geographic distribution than would result from one based more heavily on traffic volumes or vehicle miles of travel.

Allocation of capacity funds is based on a priority method which tends to favor geographic areas with high traffic volumes and congestion. However, differential level-of-service factors on a regional basis (for Category C), and a regional split for Category B 4R Improvement funds are used to achieve a greater degree of geographic balance than would exist if projects were simply prioritized on the same basis statewide.

An examination of the pattern of expenditures across districts indicates that the current state programming process results in a geographic distribution of revenues which reflects a combination of demographic, system extent, and needs related factors:

- Combined state expenditures (for programs A, B, C and H in the 1989-1991 biennium) in each district are balanced in relation to population.
- The distribution of Category A funds is fairly consistent with the distribution of lane-miles.
- The distribution of Category C funds is more even than would be expected based on population differences across districts. However, if capacity expenditures on the Interstate system were combined with those under Category C, the split of funds would be more reflective of such population (and VMT) differences.
- The distribution of Category H funds is somewhat different from the distribution of state-owned bridges across districts. Because Category H expenditures are based on severity and urgency of bridge repair and replacement needs, they will not necessarily be proportional to the number of bridges. The differences between the share of bridges vs. bridge expenditures illustrates the impacts of need-based as opposed to inventory-based allocation mechanisms.

Funding programs for local jurisdictions tend to emphasize equitable geographic distribution of funds in addition to needs-based allocation methods. For example, the County Arterial Preservation Program (CAPP) distributes funds to counties based on lane-miles (which partially, but not

fully reflect needs). Rural Arterial Program (RAP) funds are allocated to regions based on rural land area and miles of arterials and collectors. Within each region, ceilings are set for the amount or percentage of funds which can be allocated to any individual county, which ensures geographic distribution. Urban Arterial Trust Account (UATA) funds are allocated to regions based on urban population, vehicle miles of travel, and arterial needs. The Transportation Improvement Account (TIA) program funding is distributed so that a minimum of 30 percent of funds go to the Puget Sound Region, and the East and West Regions receive at least 15 percent of funds. Both UATA and TIA programs reserve a portion of funds for rural (UATA) or small (TIA) cities.

**Issue #3: What is the influence of Federal and state revenue matching policies on the types of projects which are emphasized?**

Federal and state matching policies have a very strong influence on expenditure patterns at both state and local levels of government. At the state level, the Interstate program with a 90 percent Federal match has had the most significant influence of all of the Federal matching programs. As noted above, the amount of Federal funds available (rather than needs estimates) determines the state budget level for Interstate projects. It also determines the split between capacity and preservation investments on the Interstate system. If there were greater state discretion over use of Federal funds, the allocation to project types might be based more on the state's needs and priorities. Given trends in Federal funding toward increased flexibility, it is timely for Washington to begin to examine Interstate needs and funding tradeoffs independent of Federal funding levels.

The availability of matching funds not only influences the types of projects which are emphasized, but may also affect the design characteristics of projects. Use of Federal and state design standards are a requirement for funding eligibility, whereas there may be more flexibility in design where 100 percent discretionary funds are used.

At the local level, the availability of Federal and state funding clearly influences project selection decisions, in that many local projects would not be done (or would be subject to significant delays) if outside funding were not available. These programs emphasize preservation, operational and safety improvements on arterial roads and streets. While some jurisdictions would select a different set of projects if they were offered the same funding with no restrictions, state and Federal funding programs are generally addressing local needs, and are not perceived as having a major distorting influence on local priorities.

## ■ 4.5 Project Identification and Prioritization

### **Issue #1: Does the process support identification of a wide range of alternatives, including low cost options and operational strategies?**

The technical prioritization processes as currently structured do not explicitly address a broad range of alternatives such as low cost projects, demand management strategies, public transportation, and intelligent vehicle highway systems. This does not mean, however, that such approaches are not in use. For example, Washington's Freeway and Arterial Management Effort (FAME) is one of the most notable system management processes in the country. Nevertheless, the lack of a cost-benefit approach to prioritizing projects, and the use of need or deficiency-based methods for allocation of funds do not inherently support creative, low cost approaches to solving transportation problems.

### **Issue #2: How do service and design standards affect the outcome of the programming process?**

The design standards used by WSDOT and other state agencies in Washington conform to generally accepted practices nationwide. State and local agencies applying for Federal funds must have project designs that meet or exceed AASHTO design standards (and a waiver must be obtained for valid deviations). As accepted norms of good engineering practice, design standards protect government agencies from tort liability by providing a legally defensible minimum design that reflects prudence and reasonableness.

The use of service standards in the programming process appears to be reasonable and not inconsistent with the objectives of the respective program categories (i.e., the need to deal with roads of different functional classes or in different geographic regions). However, it is important to recognize that service standards reflect important policy choices. The current process lacks the ability to perform tradeoff analyses to compare the costs and benefits of using different service standards. Overall cost savings could potentially be achieved through a better understanding of the benefits or disbenefits of moving to higher or lower standards, and an ability to identify those unique factors that would justify deviations from normal standards.

**Issue #3: Do priority methods result in biases or inconsistencies?**

Washington has been a leader in the development and application of formal and quantitative project ranking methods. The objective of these methods is to provide a consistent, objective and technical approach for comparing projects and ensuring that selected projects reflect, to the maximum extent possible, program objectives and goals.

Our assessment of the priority methods in use indicates that they provide a mechanism for making tradeoffs among candidate projects within each program category. The specific evaluation criteria used are based on objective, measurable factors such as pavement condition, accident rates, and congestion levels. The methods result in selection of a set of projects which addresses the stated program category objectives. However, some areas of inconsistency were identified:

- Different approaches to prioritization of capacity improvements were found for non-Interstate (Category C) and Interstate (Category B) systems. The Category C methods involve a comparison of project costs to an Engineering Factor which represents the benefits to be provided to road users in terms of improved traffic flow and safety. Interstate completion projects are not subjected to a quantitative ranking procedure, and Interstate 4R capacity projects are ranked using a scoring function based on level of service, traffic volume, traffic volume growth, volume/capacity ratio, accident rate, district priority, and inclusion of a transit improvement. Preservation and safety projects are treated consistently for non-Interstate and Interstate systems.
- Project cost is considered for prioritization of Category C projects but not for the other categories.
- The nature and complexity of the priority methods used for the different categories is such that it is difficult to compare the relative merit of projects across categories. A more consistent use of cost and benefit measures would facilitate such comparisons.
- Criteria used to define needs for fund allocations are not always consistent with the criteria used to define projects and set priorities. Increased consistency in the criteria used to define needs, evaluate projects and set priorities would strengthen linkages between program budgets and delivery of program results.

In addition, the following biases in the priority methods were noted:

- Prioritization methods give more emphasis to vehicular traffic flow than movement of people. Projects which support use of high occupancy vehicle facilities are not significantly favored by current priority methods (even though these types of improvements are being pursued). WSDOT is currently initiating a project with the University of Washington to explore new priority methods which are based on person-mobility as opposed to vehicular mobility.
- Technical ranking processes generally do not directly address certain objectives such as protection of the environment or economic development. Consequently, the process is biased towards projects which address traditional engineering criteria (congestion, pavement condition, safety) as opposed to broader objectives. This tendency is partially compensated for by the ability to exercise discretion in final project selections.

**Issue #4: Do the methods adequately provide for state and local project coordination?**

Priority programming regulations allow WSDOT to deviate from established priorities in project selection in order to coordinate with local agency projects. They also provide an allowance for projects to be delayed in order to allow counties or service districts to develop local funding to pay for additional highway improvements which may be done at the same time as those planned by the department. While no formalized inter-jurisdictional review process is required for the state's six-year program, informal coordination occurs between district staff and city or county public works staff.

Differences in the length and timing of programming cycles between the state and local jurisdictions sometimes present a problem for coordination of projects. In particular, the fact that WSDOT operates on a two-year cycle rather than an annual cycle means that local requests to the department for consideration of jointly funded projects may be subject to significant delays.

State and local coordination must occur well in advance of the 1-2 year programming cycle for some types of projects. Expansion of WSDOT's planning activities and involvement in joint planning efforts with local jurisdictions is an important aspect to improving coordination. One specific area of state and local coordination which must be addressed is the Growth Management Act requirement for establishment of regionally coordinated level-of-service standards. There is no mechanism to formally coordinate setting of these standards for state highways, which are critical

links (and congestion points) in urban areas. There is also no mechanism for ensuring that improvements on state highways will be made concurrently with new development.

## ■ 4.6 Program Performance Measurement

**Issue #1:** Does the programming process include an evaluation of what the program is achieving with respect to stated policy objectives?

Currently, program delivery and program performance are tracked in terms of actual versus planned expenditures and project implementation. Other types of performance measures which would indicate achievement of policy objectives are not applied on a formal basis. Such measures could describe work accomplishments (e.g., lane-miles of resurfacing), progress towards targets (e.g., reduction in capacity-deficient highway miles), changes in the physical condition of the system (e.g., average pavement condition), operational characteristics (e.g., vehicle speeds), road user benefits (e.g., reduced delay) or environmental/energy impacts. Use of actual performance versus cost comparisons would provide valuable input for the program budget process.

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## **5.0 Comparison with Other States**

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# 5.0 Comparison with Other States

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## ■ 5.1 Overview

Interviews were held with planning and engineering staffs in five other states to gain information on their respective programming processes. This information provided a basis for comparing WSDOT's approach to that of its peer agencies. The five states included in this study were Arizona, California, Oregon, Texas, and Wisconsin.

The programming processes of the five states are summarized in Table 5.1. The descriptions are highly distilled, focusing on essential features and characteristics. Washington's process is also included to provide a familiar point of departure, allow a side-by-side comparison, and illustrate the degree of summarization that is included. The table permits both a vertical review of the overall process in each state, and a horizontal comparison of a programming element across several states.

In four of the five states, responsibility for the highway system comes under a department of transportation. Only in Texas is this responsibility now exercised by a state highway department, although the department does coordinate highway-related planning by public transportation agencies.<sup>1</sup> All states reviewed have some type of transportation commission, although the scope and authority of each commission varies considerably.

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<sup>1/</sup> The Texas Legislature recently passed a bill creating a department of transportation.

**Table 5.1 Comparison of State Processes**

	Washington	Arizona
<b>Organization</b>	DOT Transportation Commission establishes policy for the DOT, adopts state transportation plan, approves DOT budget, authorizes legislative requests	DOT State Transportation Board has statutory authority to prioritize all highway projects
<b>Program Cycle</b>	Six-year program updated biennially	Five-year construction program updated annually; 50-year transportation future plan 25-year systems plan 10-year project priority list
<b>Key Policy Concerns</b>	Preservation Mobility (passenger and freight) Economic development Environmental and energy conservation Planning and programming Finance	Routine maintenance Pavement preservation Matching federal aid Reconstruction New highways Non-traffic functions
<b>Categories</b>	Preservation Interstate completion and 4R Non-Interstate new capacity Bridge rehabilitation and replacement Maintenance Local aid (pass-through of federal aid)	Interstate completion Interstate reconstruction Controlled access routes (Maricopa, Pima Counties) Pavement preservation Non-interstate major construction Bridge, rail crossing, hazard elimination Transportation system management
<b>Needs</b>	Estimates of statewide needs	Analysis of statewide needs or specified funding amounts for certain categories
<b>Fund Allocation</b>	Order of program category funding set by statute	Department policy, some geographical controls on road-related revenues Transportation Board can adjust funding levels by category
<b>Priority Ranking</b>	Technical ranking used for preservation and bridge programs Cost-effectiveness analysis used for non-Interstate new construction	Multiple objectives, including air quality and consistency with regional plans Cost-benefit analyses of several categories Significant role of district engineer recommendations Sufficiency ratings are a major tool Criteria receive equal weight, but are not combined into a total score

Table 5.1 Comparison of State Processes (continued)

	California	Oregon
<b>Organization</b>	DOT California Transportation Commission (CTC) sets policy and allocates funds based on projects nominated by Caltrans and regional transportation planning agencies	DOT Transportation Commission establishes policy and adopts highway program
<b>Program Cycle</b>	Varies by category: 1, 4, and 7 years	Six-year program cycle updated biennially
<b>Key Policy Concerns</b>	Preservation Urban congestion relief Interregional roads Clean air impacts Safety Federal and local matching funds	Preservation Equitable fund distribution on basis of need Cost-effective use of state and federal funds Economic growth Reduction of congestion Highway modernization (improved geometrics)
<b>Categories</b>	Highway Systems Operation and Protection Plan (HSOPP) State Transportation Improvement Program (STIP) Traffic Systems Management Plan (TSM) Other	Preservation Modernization Operations Miscellaneous Maintenance
<b>Needs</b>	Analysis of statewide needs	Analysis of statewide needs or specified funding amounts for certain categories
<b>Fund Allocation</b>	Allocated by Commission subject to statutory geographic split and minimum distribution by geographic area to be fulfilled in five years	Established by the Transportation Commission, including: <ul style="list-style-type: none"> <li>• Use of available federal funds</li> <li>• Use of I4R for preservation</li> <li>• Allocation of \$6M/year (state funds) to interstate modernization</li> <li>• \$350M in next six years for modernization</li> <li>• Retain maintenance at current level</li> </ul>
<b>Priority Ranking</b>	Done at regional level (counties, then RTPs) for categories other than HSOPP HSOPP and interregional roads prioritized by Caltrans with input from rural counties Regional process involves a technical screen and a policy screen, followed by a scoring based upon technical merit, policy priority, and degree to which air quality control measures are included Regional process supports enhancement of the interregional road network The CTC reviews each program using a set of statutory and policy criteria	Priorities developed statewide by headquarters Technical ranking and scoring used for modernization, projects funded by HBR, hazard elimination, and railroad crossing protection projects Considerable flexibility in adjusting the scheduling of projects

Table 5.1 Comparison of State Processes (continued)

	Texas	Wisconsin
<b>Organization</b>	Highway Department Transportation Commission establishes policy and adopts highway program, has discretionary authority over group of projects in program	DOT Transportation Projects Commission helps shape Major Projects program only Contracts with counties for all routine maintenance
<b>Program Cycle</b>	Ten-year program with biennial updates or biennial or annual allocations to Districts 20-year Strategic Mobility Plan	Six-year program updated every two years Unified highway/transit fund
<b>Key Policy Concerns</b>	Preservation Safety Mobility	Economic development Urban improvements (including multi-modal) Preservation
<b>Categories</b>	Added Capacity and New Location 1. Interstate Highway System-Construction 2. Interstate Highway System-4R Construction 3. Primary, Secondary and State System-Construction Other Categories: 4. Interstate, Primary, Secondary and State System-Rehabilitation and Upgrade 5. Farm to Market and Ranch to Market Road System-Construction and Rehabilitation 6. Urban System/Principal Arterial Street System (PASS)-Construction 7. Preventive Maintenance-Construction 8. Bridge Replacement and Rehabilitation 9. Miscellaneous-Construction	Maintenance Existing Highway (3R) Major Project Interstate Bridge
<b>Needs</b>	Statewide estimates of deficiencies or specified funding amounts for certain categories	Statewide analysis of deficiencies
<b>Fund Allocation</b>	Depends upon program category • Amount fixed by statute • Match of federal funds • Determination by Commission in consultation with Department	Legislative • Maintenance • Major Project • All others WisDOT • Existing highway • Interstate • Bridge
<b>Priority Ranking</b>	Categories 1-3: Added capacity or new location • Ranked on basis of cost effectiveness • Statewide ranking performed by Central Office Other Categories (4-9): • Funds allocated by formulas to Districts • Districts exercise discretion in project selection within categories	Some controls to maintain program stability over time Multiple objectives, deficiency criteria; guidelines on appropriate improvement Cost-benefit analyses for significant capacity improvements (Major Project, 3R) No overall score (except Major Projects) Allow flexibility in project selections

A five- or six-year program cycle is typical of the states reviewed. Texas has a 10-year program period, while California's program periods vary by category (with the longer periods associated with categories involving lengthier periods of construction project development and review). In Arizona and Texas the programming process is tied to a planning document adopting a much longer term perspective, from 20 to 50 years. This is not to imply that the other states do not do planning; what are identified are documents fixed to a specific planning horizon.

## ■ 5.2 Key Policy Concerns

The policy concerns listed in Table 5.1 include those policies identified explicitly in planning and programming documents, as well as those policies that are implicit in a state's program (often identified during interviews). The reason for this approach was to provide the most complete description of objectives and circumstances to which a programming process responds.

All of the states reviewed listed preservation as a policy concern. Other concerns reflected the specific situations within each state, including items such as economic growth, congestion relief, highway modernization, and safety. Some states identify the effective leveraging of matching funds as a policy objective.

## ■ 5.3 Program Categories

Program categories establish the framework of the programming process, and define the buckets by which available funds are allocated. Program categories thus play an important role in both the structure and the functioning of a programming process. The five states vary somewhat in how their categories are defined:

- Several states use an approach similar to Washington's, in which the programming categories reflect a mixture of considerations: e.g., type of work (such as preservation vs. capacity), type of facility (such as pavement vs. bridge), and functional class (Interstate vs. non-Interstate). The detail of this breakdown varies, with Wisconsin's categories comparable in number to Washington's, but with Arizona and Texas having more numerous lists. The matching provisions of Federal programs and responses to specific local problems have no doubt influenced the definition of respective categories.

- Oregon has defined categories based upon specific types of work, without regard to type of facility or functional classification.
- California has also focused on the type of work in delineating its program categories, but the categories encompass a multimodal perspective (e.g., transit improvements that ease urban freeway congestion would be acceptable projects).
- California has structured its program to have only four major categories, but to reflect more specific program concerns within sets of subcategories. For example, the State Transportation Improvement Program (STIP), which includes capacity- or mobility-related construction and improvements, comprises two sets of subprograms: those for projects nominated by regional transportation planning authorities, and those for projects nominated by Caltrans. Furthermore, these subcategories reflect different modes (e.g., urban rail and commuter rail as well as highways), and different interests (e.g., congestion relief in urban areas, and interregional roads in rural areas).

## ■ 5.4 Needs and Program Allocations

Estimates of needs within each category among the five states are for the most part based upon predictions of deficiencies. (The technical details of these predictions may vary considerably among states, but overall the procedures reflect the same basic approach.) In some categories in the programs of Texas, Oregon, and Arizona, total program "needs" are fixed (e.g., by statute) at a specified amount.

Allocation of funds are accomplished in different ways:

- Some allocations are nondiscretionary, but are fixed by statute as described above. Other nondiscretionary effects are introduced by mandated geographic splits or minimum amounts that must be distributed by geographic area.
- Discretionary allocations are handled in different ways among the five states, whether by actions of the legislature, the transportation commission, or the DOT itself.
- Nondiscretionary features (e.g., required minimum distributions, geographic splits) are intended to promote equity, but reduce the flexibility and judgment that can be exercised in allocating funds. For example, the combined geographic split and minimum distribution requirements

in California resulted in the commission's adjustments of both project priorities and modal shares (i.e., highway funds vs. rail funds) to satisfy the program category funding and geographic distributions simultaneously.

## ■ 5.5 Priority Ranking

Priority ranking procedures vary considerably among the five states, both in their analytic approaches and in the degrees and ways by which they introduce flexibility and adaptability:

- Several states compute priorities using a technical evaluation procedure that accounts for multiple objectives. However, whereas Oregon, for example, computes a total score for each project, Arizona and Wisconsin do not. All of these states retain considerable flexibility in adjusting project priorities.
- California and Texas build a decentralized element into their ranking. For example, projects in certain categories in California are ranked by the Regional Transportation Planning Organization before submittal to Caltrans and the commission. In Texas, the districts receive a formula-based allocation for certain categories, and exercise virtually complete discretion in project selection. Other states (e.g., Arizona) rely heavily on recommendations of the district engineer in assessing priorities.
- Several states go beyond technical rankings to employ cost-effectiveness or cost-benefit calculations for projects in certain categories.
- The states vary in the degree to which they face problems of mobility, growth management, environmental degradation, and so forth. However, California provides interesting examples of how such policy concerns may be incorporated within a programming process. It includes a "clean air" evaluation at two points in its policy screening: at an early stage, and in the final scoring at the regional level. As a second example, its emphasis on multimodal concerns is illustrated through the definition of multimodal program subcategories, as well as the allowance of multimodal solutions to highway problems.